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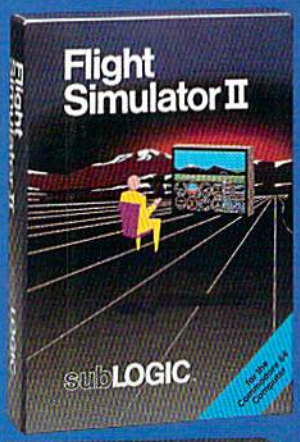

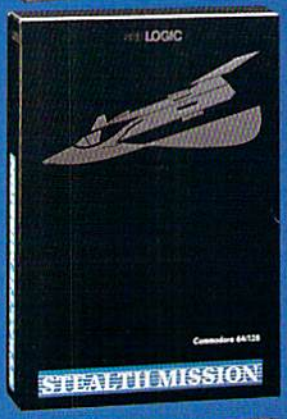

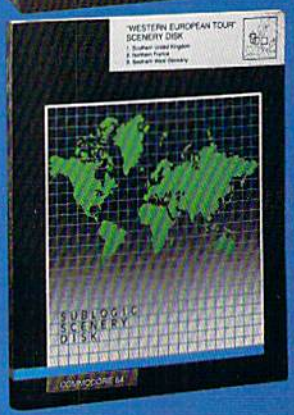

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*=General, **64**=Commodore 64, **+4**=Plus/4, **16**=Commodore 16, **128**=Commodore 128

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editor's notes

In a recent interview published in the *Wall Street Transcript*, Irving Gould, Commodore's chairman and CEO, offered a candid appraisal about the company's current state of affairs. Indeed, 1988 has been a good year for Commodore. Earnings and profits are up. Despite the good news, Gould acknowledged that Commodore continues to have problems in the U.S. market, where MS-DOS machine sales are still dramatically booming and Apple holds a sizable chunk of the market.

Gould reminded us of the true global nature of Commodore's business, something U.S. consumers often overlook. For example, in 1988, the European market represented nearly 70 percent of total Commodore sales. In West Germany, Commodore holds a commanding position, close to 80 percent of the consumer market; in the German business sector, Commodore is second only to IBM. The market profile for the Scandinavian countries and Switzerland is similar. In Australia and Canada, Commodore is looking at a solid 70 percent of consumer market share.

The work ahead, then, lies in the U.S. Gould noted that the U.S. should represent at least half of any company's business. So what will Commodore do here? After acknowledging that 64 and 128 sales have slackened, Gould stated, "Our future lies in the corporate business part of the market as well as the educational and government markets," and the machine that fits the bill is the Amiga. Gould added that he believes the Amiga is the perfect home computer.

It is on this point that this writer raises a flag—a big red one.

Is the Amiga really the computer that should be sold to the office, to the schoolroom, *and* to the home? The question is not whether the Amiga has merit in all these environments. It is a marvelous computer on a number of counts. Rather, how realistic is Commodore's approach in positioning the Amiga head-on against a 386-based PC or a Macintosh in the office? Or against Apple in the classroom? Or against a PC compatible, a Tandy, an Apple, or even its own 64/128 in the home? It's naïve to think that Commodore has the resources or marketing savvy to effectively wage war in all three arenas.

It's clear that the Amiga is Commodore's future. Sales are climbing but not yet breaking any records. (Gould pointed out that the Amiga started off slow for lack of software support, but added that the number of titles now exceeds 1500.) However, Commodore's bottom line shows that the Amiga's movement, along with that of its MS-DOS machines, is more than offsetting the gradual decline in 64/128 sales. For years, Commodore did a great job of marketing the 64 and 128. In fact, these machines are still selling at a respectable rate.

But the key to Commodore's future does not lie simply in the existence of the Amiga, but in how this machine is positioned and sold in the U.S. market. If Gould's comments are any clue, the company is in for a long, steep climb. In order to compete dynamically, Commodore must do more than run occasional spot ads suggesting that the Amiga is the machine of choice for business, school, and home. A much more aggressive—and specific—scheme is in order.

The Amiga, to some, might be an everything machine, but the decision makers at Commodore need to find a strategy to convince a very tough, competitive market that this is true. As long-time Commodore supporters, we wish them luck.

Lance Elko
Senior Editor

COMPUTE!'s GAZETTE

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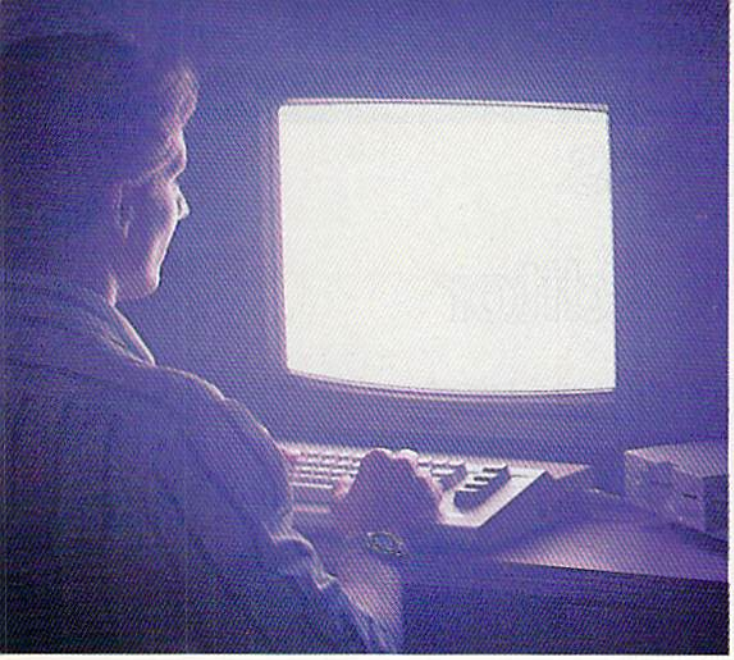

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* Single disks for *COMPUTE!*, *Gazette*, or *Apple Applications* are $15.00. NOTE: No disks dated prior to January 1986 are available.
* Back issues of *COMPUTE!'s PC Magazine* are $16.00 each and back issues of *Atari ST Disk & Magazine* are $8.00 each. (These publications are available only as magazine/disk combinations.) The following issues are **NOT** available: ***PC Magazine:*** 9/87, 11/87. ***Atari ST Disk & Magazine:*** 10/86.
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letters to the editor

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Amiga *and* 64

I wanted to let your readers know: If you're planning on upgrading to an Amiga, *do not* plan on storing your 64 and equipment away somewhere. I use my 64 as much as the Amiga. I love the Amiga's graphics, sound, keyboard feel, and the ability to tinker with MS-DOS. I'm proud of the Amiga, but the 64 can do practically everything the Amiga can do.

The 64 is still my favorite when it comes to home computers. When I had my new desk built, I had it made big enough for my Amiga *and* 64 (both run off of a 1084 monitor). Remember, plan your computer space to include your 64. You'll be glad you did!

Steve Franklin
Bossier City, LA

Right Product, Wrong Machine

In your "Buyer's Guide to Word Processors and Spelling Checkers" (November), I noticed that *Term Paper Writer* by Mediagenic is listed as a 64 program. When it was first out, I anxiously tried to obtain a copy. I was disappointed to find that it is available only for the 128.

Tony Patton
Louisville, KY

You are correct. It is available for the 128 only. We regret the error.

Whose Copyright?

I am incorporating one of your programs, "3-D Sprites" (August 1988), into a BASIC program of my own. Is the resulting program (or part of it) still considered copyrighted by you? Could it be public domain?

David Ferris
West Covina, CA

Our program retains its copyright under any circumstances. In the case you have cited, our copyright would protect that part of the program which is ours. Since our program—alone or as part of yours—is copyrighted, it is not in the public domain.

If you write programs for your own use, it's fine to incorporate any of our programs or routines. In fact, this is something we strongly encourage. But if you write software for personal or financial gain using one of our programs, you are clearly outside the bounds of the copyright law. One obvious exception: You can use our programs or routines in any software you submit to us for publication.

A 128D Owner's Solution

I've read several letters in your column about problems with the 128D system. In response, I'd like to report that I've owned my system for about a year and think it's fantastic.

Most of the problems that have been reported are really disk drive problems, not system problems. First, the drive mechanism that was installed in early models did not function well. Second, the 128D does not come with an 8/9 switch. Third, the new drive ROM will not load some 64 software. I had problems in all three areas. I took my system to an authorized repair center while it was under warranty. They replaced the drive mechanism and installed an 8/9 switch free of charge. I still have the ROM problem but have determined that the new ROM does not like 64 fast loaders. If I stay away from those programs and find alternatives, there is no problem—a small sacrifice to gain a faster drive and twice the storage space of the 1541, plus autoboot capabilities.

Wes Eardley
President, SPUG Computer Club
Springfield, IL

PC *SpeedScript*

Is *SpeedScript* available in an MS-DOS version?

Jack Babcock
Rialto, CA

It will be soon. COMPUTE! Books is publishing PC SpeedScript, *by Randy Thompson (*Gazette *columnist and contributing editor), in June. The price is $23.95. Written in* Turbo Pascal, *this MS-DOS version of* SpeedScript *is very closely modeled after its namesake. The book will include source code and can be typed in using* Turbo Pascal *4.0 or 5.0, or with "MLX" using BASIC. A disk will be available for $12.95 plus $2.50 for postage and handling. Beginning in May, orders will be taken from COMPUTE! Books, P.O. Box 2165, Radnor, PA 19089.*

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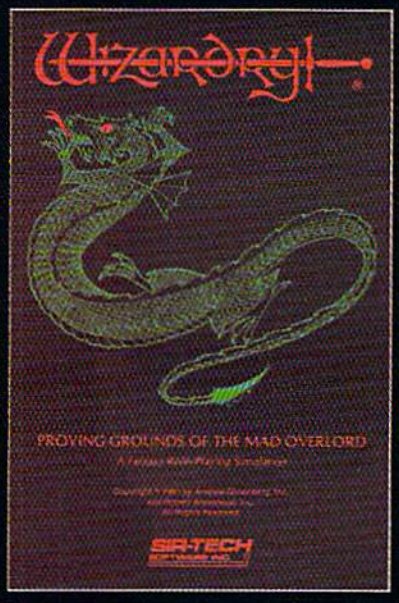

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PLAY IT TO THE HILT!

* Many other Wizardry scenarios coming for Commodore players.

COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS

By Mickey McLean

Play with the Pros

Tee it up with Jack Nicklaus, play one-on-one with Michael Jordan or Larry Bird, butt helmets with John Elway, or match managerial wits with Pete Rose. Sports-celebrity endorsements are a hot commodity in the entertainment software industry. Some titles feature the player or players in animated action on the screen while others simply carry their endorsement.

Accolade's *Jack Nicklaus' Greatest 18 Holes of Major Championship Golf* ($29.95) features Nicklaus' favorite 18 holes along with two additional Nicklaus-designed courses.

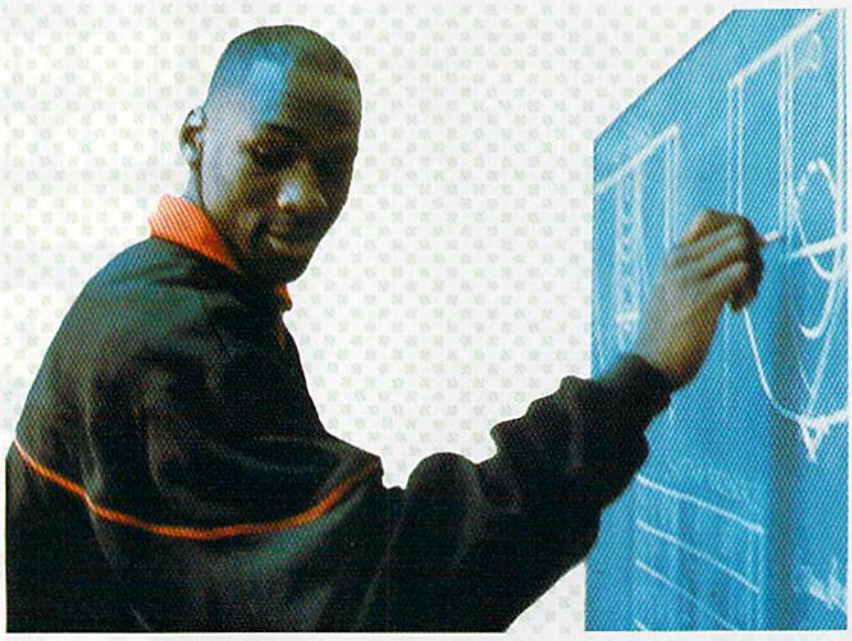
You can arrange a tee time with either three human opponents, a computerized Jack Nicklaus, or a variety of computerized men and women. Battle it out for big money using Skins scoring or choose stroke play. You also have a choice of pro, men's, or ladies' tees. Designed as an updated version of Accolade's popular *Mean 18*, the new edition has added wind intensity and direction and uphill or downhill lies for more realistic play.

Jack Nicklaus' Greatest 18 Holes of Major Championship Golf is the first joint project produced as the result of a three-year agreement between Jack Nicklaus Productions and Accolade (550 South Winchester Boulevard, Suite 200, San Jose, California 95128). Nicklaus, recently named by *Golf Magazine* as the Player of the Century, plans to work with Accolade on additional home computer golf simulations including several course disks.

"Together, our goal is to create a new breed of golf simulations—products that will help bring the special character and tradition of the game of golf to millions of computer owners," Nicklaus said.

Ralph Giuffre, vice president of marketing for Accolade, said that the use of the name of a celebrity such as Nicklaus in association with a game gives the consumer an instant familiarity with the product.

"The celebrity needs to transcend the sport," Giuffre said. "Jack Nicklaus is golf. You know it's a golf product, and you know Jack Nicklaus has high standards."



Michael Jordan details the finer points of his game for Electronic Arts.

Another recent release that relies on sports celebrities is *Jordan vs. Bird: One on One* ($29.95) from Electronic Arts (1820 Gateway Drive, San Mateo, California 94404). The game pits the NBA's two hottest stars in a one-on-one battle. The game also features an Air Jordan Slam-Dunk Contest and a Larry Bird 3-Point Shootout. The two stars assisted the game's designers by offering suggestions concerning their playing style and personal characteristics.

John Elway's Quarterback ($29.99) from Melbourne House (711 West 17th Street, Unit G9, Costa Mesa, California 92627) is based on the coin-operated game of the same name. Elway does not appear in this arcade-style football game; rather, he contributes as the game's endorser.

Yet another release scheduled for this spring, from Gamestar (Mediagenic, 3885 Bohannon Drive, Menlo Park, California 94025), is the Commodore 64 version of *Pete Rose Pennant Fever* ($34.95). The game designers have incorporated Rose's philosophies of playing and managing baseball into the game.

Charting GEOS

The most recent addition to the GEOS family of products from Berkeley Softworks (2150 Shattuck Avenue, Berkeley, California 94704) is *geoChart* ($29.95).

Users can design charts with data imported from GEOS 1.2, 1.3, and 2.0; GEOS 128; *geoWrite Workshop; geoWrite Workshop 128; geoFile; geoFile 128; geoCalc; geoCalc 128;* and the Note Pad desk accessory. Chart types include pie, unibar, area, point, line, column, bar, scatter point, and scatter line.

Features include the ability to manipulate charts by changing type, fonts, point sizes, and styles. It also supports all 53 fonts in *FontPack Plus*. Charts can be saved in photo and text albums or copied into GEOS applications.

COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS

California Here We Come

Personal computer users have seen the world, thanks to Blue Lion Software (90 Sherman Street, Cambridge, Massachusetts 02140) and its line of adventure simulations. With the help of Blue Lion, we've visited Paris, London, Spain, and Washington, D.C., without leaving our homes. Its newest release takes players on a journey through eight decades of movie history in sunny Southern California.

Gameplay in this series involves traveling around a city or country, collecting clues and answering questions. Ultimately a mystery must be solved.

In *Ticket to Hollywood* ($29.95), you must use six detailed 3-D maps to locate famous landmarks. The maps also help you track movie stars around town. While moving through Tinseltown, you are quizzed on trivia to test your knowledge of such stars as Katharine Hepburn, Spencer Tracy, and Humphrey Bogart.

In addition to sightseeing, the object of the game is to follow leads and gather clues which lead to the solution of one of 25 mysteries. You can also question the "director" about your favorite stars or movies.

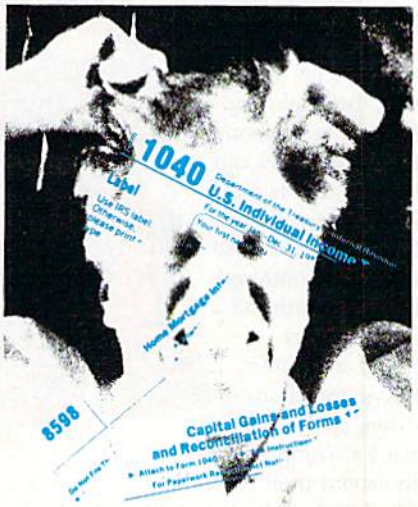
The Freedom Stick from Camerica operates as a wireless remote control.

Look! No Wires!

Have you ever felt cramped playing a computer game, especially in head-to-head competition? Camerica (230 Fifth Avenue, Suite 1100, New York, New York 10001) has alleviated this problem with a wireless joystick. The Freedom Stick ($69.95) utilizes infrared technology similar to a television remote control, enabling you to move more than 20 feet away from the screen.

The arcade-style joystick can be switched from manual play to automatic rapid-fire action. You can even aim the stick away from the screen and it will still operate the game. Simultaneous two-player games can be played using two controllers.

The package comes complete with the Freedom Stick, an infrared receiver to attach to the computer, and four suction cups.



It's Tax Time Again

Pull out your shoeboxes full of receipts, sharpen your pencil, and get ready to pay your fair share to the federal government. It's time to file your income tax. Taxaid Software (606 Second Avenue, P.O. Box 100, Two Harbors, Minnesota 55616) has released its all-new version of the *Taxaid* ($49.95) income tax preparation program for Commodore computers.

The new edition includes all the current changes in the tax laws for the 1988 tax year. *Taxaid* prepares IRS Form 1040; Schedules A, B, C, D, E, and SE; and Form 2441. Features include automatic calculations and built-in tax tables.

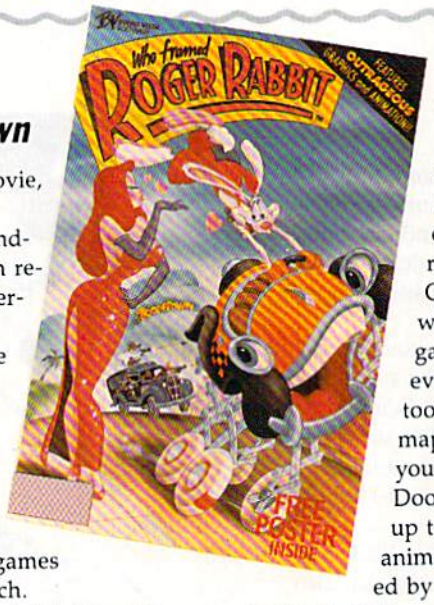
The Envelope, Please...

Awards in all three computer gaming categories at the 1988 Origins Convention were swept by MicroProse Software (180 Lakefront Drive, Hunt Valley, Maryland 21030).

Pirates! was named Best Fantasy or Science Fiction Game, and it also picked up the award for Best Screen Graphics. MicroProse completed the sweep with *Project: Stealth Fighter* winning the prize for Best Military or Strategy Game.

COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS



Save Toontown

You've seen the movie, read the book, and listened to the soundtrack. Now you can relive the movie experience on your 64. Movie merchandise tie-ins are nothing new, but with the popularity of home computers, movie merchandisers are looking hard at computer games to extend their reach. The latest example is *Who Framed Roger Rabbit* ($29.95) from Buena Vista Software (Disney Consumer Products, 3800 West Alameda Avenue, Suite 325, Burbank, California 91505).

Players must help Roger save Toontown from the evil Judge Doom. Race Benny the Cab through the streets of Tinseltown, try to retrieve Marvin the Gag King's missing will, and then use gags to get past the evil weasels at the cartoon Gag Factory. A map screen displays your progress against Doom. Screens also pop up to reward you with animated prizes presented by characters such as Jessica Rabbit.

The program is three games in one, each with multiple skill levels, music, sound effects, and animated color graphics. The package includes a Quick Start Card, a full-color poster, and a 12-page Gag Factory Catalog.

Arcade Mania

The conversion of coin-operated arcade hits into home computer games has become one of the hottest trends in Commodore 64 entertainment software. Some arcade companies offer their own games for the computer market, while others have made licensing agreements with existing software manufacturers.

Two arcade heavyweights, Konami and Taito, are moving quickly into the Commodore arena. Konami (815 Mittel Drive, Wood Dale, Illinois 60191), the largest independent producer of videogames for the Nintendo Entertainment System, launched its home computer effort at last summer's Consumer Electronics Show.

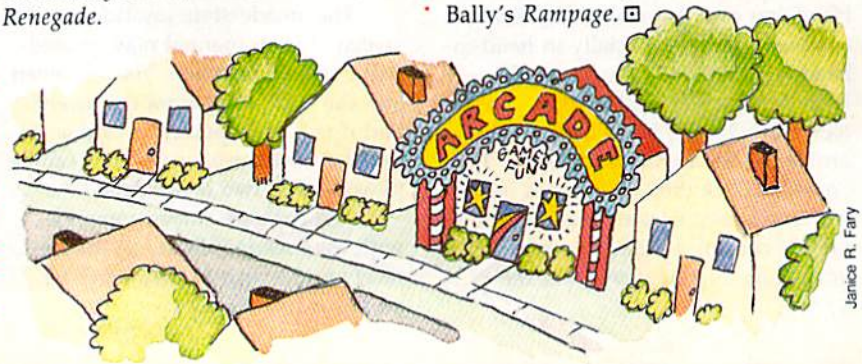
"It was a 'natural' for us to get into home computer games, given our experience in videogames," said Emil Heidkamp, vice president of Konami's consumer division. "We're ready to grow with the industry, providing a continuous library of popular games to home computer users as the market expands."

Konami's current list of titles includes *Contra, Jackel, Rush 'n Attack, Boot Camp, Ajax, Castlevania, Metal Gear, Life Force,* and *Teenage Mutant Ninja Turtles.*

Taito Corporation of Japan has set up a North American home entertainment software subsidiary called Taito Software (267 West Esplanade, Suite 206, North Vancouver, British Columbia, Canada V7M 1A5).

Arcade titles available from Taito include *Operation Wolf, Rastan, Bubble Bobble, Sky Shark, Alcon, Arkanoid,* and *Renegade.*

Other companies jumping on the arcade bandwagon include Mindscape (3444 Dundee Road, Northbrook, Illinois 60062), with a licensing agreement with Sega to distribute its arcade titles, and Activision (Mediagenic, 3885 Bohannon Drive, Menlo Park, California 94025), with the release of Bally's *Rampage.* ⊡



Janice R. Fary

Dungeons and Dragons Joins the Computer Age

Strategic Simulations (distributed by Electronic Arts, 1820 Gateway Drive, San Mateo, California 94404) recently reached an agreement with TSR to produce software based on the popular Advanced Dungeon & Dragons game.

Dungeon Master's Assistant, Volume 1: Encounters ($29.95), a utility program designed to be used with TSR's *Advanced Dungeon & Dragons,* reduces game prep time by several hours per session. The database contains over 1000 encounters and over 1300 monsters and characters. The data can be modified by adding original monsters and encounters.

Heroes of the Lance ($29.95), derived from the first AD & D Dragonlance game module, *Dragons of Despair,* takes you into the ruins of the temple Xak Tsaroth to recover the Disks of Mishakal. You control eight companions with various skills and attributes in battles against monstrous Draconians, giant spiders, skeletal undead, and Khisanth, an ancient but formidable black dragon.

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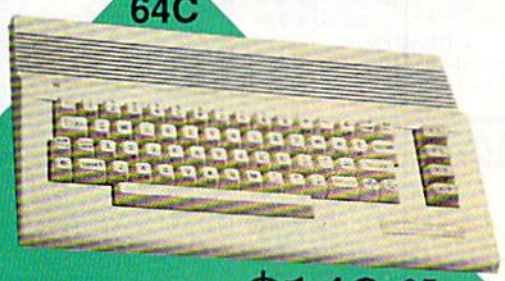

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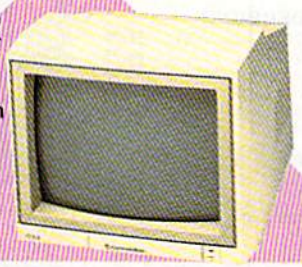

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Do you have a question or a problem? Have you discovered something that could help other Commodore users? We want to hear from you. Write to Gazette Feedback, **COMPUTE!'s Gazette,** *P.O. Box 5406, Greensboro, NC 27403. We regret that, due to the volume of mail received, we cannot respond individually to programming questions.*

Alphabetizing "SpeedCheck" Dictionary Files

I frequently use "SpeedCheck" for the 64 (December 1985 *Gazette* and the *SpeedScript* disk). Is there a way to alphabetize my SpeedCheck dictionary so that I can more easily check the entries for spelling errors?

A. J. Parone, Jr.
Philadelphia, PA

The following short program reads in each SpeedCheck dictionary file (64 version only), sorts it, and writes it back to the disk:

```
EQ 10  POKE53280,12:POKE53281,1
       2:PRINT"{CLR}{WHT}{N}
       {DOWN}{RVS}SORT DICTIONA
       RY ENTRIES"
SE 20  PRINT"{2 DOWN}INSERT DIC
       TIONARY DISK{DOWN}":WAIT
       203,64,64:POKE198,0:POKE
       828,ASC("A")
GB 30  CLR:OPEN15,8,15:L=PEEK(8
       28):GOSUB290:NW=0:PRINT"
       READING {RVS}";CHR$(L);"
       {OFF} WORDS"
HQ 40  GET#1,K$:K=ASC(K$+CHR$(0
       )):IFK>127THENK=KAND127:
       NW=NW+1
XR 50  IFK<>39THENK=KOR64
KJ 60  IFST<>64THEN40
FG 70  CLOSE1:IFNW<2THEN270
RE 80  DIM WD$(NW):GOSUB290:FOR
       N=1TONW:WD$(N)=""
GF 90  F=0:GET#1,K$:S=ST:K=ASC(
       K$+CHR$(0)):IFK>127THENK
       =KAND127:F=1
SE 100 IFK<>39THENK=KOR64
BS 110 WD$(N)=WD$(N)+CHR$(K):I
       F F THEN IF S<>64 THEN
       {SPACE}NEXTN
KJ 120 IFS<>64THEN90
GF 130 CLOSE1:PRINT"{DOWN}
       {RVS}SORTING..."
GE 140 H=3*H+1:IFH<NWTHEN140
XC 150 H=INT(H/3):FORI=H+1TONW
       :V$=WD$(I):J=I
XS 160 IFWD$(J-H)<V$THEN190
HA 170 WD$(J)=WD$(J-H):J=J-H:I
       FJ<=HTHEN190
GX 180 GOTO160
AM 190 WD$(J)=V$:NEXTI
FS 200 IFH<>1THEN150
RE 210 PRINT"{DOWN}SAVING ENTR
       IES FOR "L$:PRINT#15,"S
       0:"+L$:GOSUB310:IFER<>1
       THEN270
JD 220 OPEN1,8,8,"0:"+L$+",S,W
       ":GOSUB310:IFER<>0THENC
       LOSE1:GOTO220
RA 230 PRINT#1:FORI=1TONW:PRIN
       TWD$(I)
FE 240 FORJ=1TOLEN(WD$(I)):K=A
       SC(MID$(WD$(I),J,1))AND
       63
DK 250 IFJ=LEN(WD$(I))THENK=KO
       R128
JR 260 PRINT#1,CHR$(K);:NEXTJ,
       I
CC 270 CLOSE1:CLOSE15:IFL<90TH
       ENPOKE828,L+1:GOTO30
MH 280 END
AH 290 L$=CHR$(L):OPEN1,8,8,"0
       :"+L$:GOSUB310:IFER=0TH
       ENGET#1,K$:RETURN
FM 300 CLOSE1:CLOSE15:END
KR 310 INPUT#15,ER,EM$,ET,ES:E
       R$=STR$(ER):ET$=STR$(ET
       ):ES$=STR$(ES)
HR 320 IF ER>1 THEN PRINT"
       {DOWN}{RVS} DISK ERROR:
       ";ER$;" ";EM$;ET$;ES$:
       CLOSE1
DM 330 RETURN
```

Lines 10–20 clear the screen and wait for the user to insert the dictionary disk. Line 30 opens the disk error channel (using the subroutine at 290–300) and then opens the dictionary file (with the subroutine at 310–330). The number of words in the file is determined by lines 40–60. Lines 70–120 read the words from the file and place them in the array WD$. The shell sort in lines 130–200 sorts the array. And finally, lines 210–280 write the file back to the disk.

SpeedCheck has a unique way of storing words in its dictionary files. First, it leaves off the first letter of each word, since all words in a particular dictionary file begin with the same character. Second, instead of using a separator character between words, it sets the high bit of the byte representing the last character in a word. This storage format makes dictionary files smaller but slows the sort program because it must initially decode the file.

Disk Drive Memory

I've been using a cassette drive with my 64 for the last three years. Now I'm trying to learn machine language, and it seems to me a disk drive is a necessity. One thing is not clear in my mind: Does a disk drive add memory to a computer?

Robert Snellman
Wyandotte, MI

When you turn on your Commodore 64, it shows 38911 bytes of free RAM. Adding a disk drive does not change this number. So in that sense, a disk drive does not add memory to your system. But a disk drive does provide a different type of memory—external memory. The disadvantage of external memory is that it takes longer to read from or write to than internal RAM. The advantage is that it is not volatile—write your data to a disk and your information will be safe.

If you think of a disk drive as a super-fast, ultrareliable cassette drive, you won't be very wrong.

One matter that confuses the issue is the fact that Commodore drives have small RAM banks of their own. They use this memory for temporary workspace. In general, this RAM is of no interest to beginning programmers. It has been used to rewrite portions of the Commodore DOS. For example, GEOS writes its disk speedup routines into this RAM for faster operation.

Printer: Are You There?

Some time ago, I wrote a budget program in BASIC. I took great care to put a lot of error trapping into it so that common mistakes wouldn't exit the program with an error message. My problem is I can't figure out how to test for a printer. If I try to print out my final results without having the printer turned on, I get "DEVICE NOT PRESENT" and

lose all my data. Please tell me how to test for this.

Alan Moyer
Natick, MA

From BASIC, it is quite easy to check whether the printer is online. Output a null character—CHR$(0)—and then read the reserve variable ST. The short routine below performs this test:

```
100 GOSUB900:END
900 OPEN4,4,0:PRINT#4,CHR$(0)
910 IFST=0THENPRINT"PRINTER
    PRESENT":CLOSE4:RETURN
920 PRINT"CHECK PRINTER":CLOSE4
930 PRINT"PRESS SPACE BAR TO TRY
    AGAIN"
940 GETA$:IFA$=""THEN 900
950 GOTO940
```

You can use the same technique in machine language, or you can rely on the Kernal routine CHKOUT. CHKOUT specifies the file number representing the current output channel and must be called just prior to sending a character with CHROUT. Many Kernal routines, including CHKOUT, return with the carry bit set if an error occurs. An offline printer is one such error that CHKOUT recognizes.

Here is a short ML routine that redirects output to the printer and checks for its presence using CHKOUT:

```
; Check printer routine
;
SETLFS    =   $FFBA
SETNAM    =   $FFBD
CLOSE     =   $FFC3
OPEN      =   $FFC0
CLRCHN    =   $FFCC
CHKOUT    =   $FFC9
STROUT    =   $AB1E
GETIN     =   $FFE4
;
PRCHK       LDA #1          ;use channel 1
            LDX #4          ;printer is device 4
            LDY #0          ;secondary address
            JSR SETLFS      ;set logical file
            LDA #0          ;length of filename is zero
            JSR SETNAM
            LDA #1
            JSR OPEN        ;open printer channel
            LDX #1
            JSR CHKOUT      ;send output to channel 1
            BCC PROK        ;carry is clear - no error
            LDA #1          ;otherwise, handle error
            JSR CLOSE       ;close channel to printer
            JSR CLRCHN      ;restore I/O
            LDA #<MSG       ;Print error message
            LDY #>MSG
            JSR STROUT      ;using ROM string printer
WAIT        JSR GETIN       ;wait for space bar
            CMP #32         ;space is ASCII 32
            BNE WAIT
            JMP PRCHK       ;space pressed, so try again
PROK        LDA #1          ;printer is online
            JSR CLOSE       ;close printer channel
            JMP CLRCHN      ;restore screen output and RTS
;
MSG         .ASC "CHECK PRINTER, PRESS SPACE BAR TO TRY AGAIN"
            .BYTE 13,0
```

A Commodore Network

I own a Commodore Plus/4, a Commodore 128, and a 1541 disk drive. I was wondering if I could connect both computers to the drive at the same time. Would this burn up the circuitry inside any of the units?

Benji Courliss
Goldsboro, NC

We connected a Plus/4 and a 128, a 64 and a 128, two 64s, and two 128s directly to a single disk drive—a 1541 and then a 1571—without much success. In all cases, the drive failed to operate properly or at least was unreliable.

There are some commercially available "black boxes" that permit two or more computers to be hooked up to a single peripheral. In fact, in our listing room, several computers share the same printer.

When the Commodore 64 was new and disk drives cost $600, there was more demand for these black boxes. Now, it may not cost you much more to buy a second drive. If you are still interested, try writing to Black Box Catalog, P. O. Box 12800, Pittsburgh, Pennsylvania 15241.

Many schools connect Commodore computers together using networking systems such as RTC's Multi-Link Networking System and Berkeley Softworks' geoNet. These systems allow the teacher greater flexibility and control over a classroom full of computers. These products are designed primarily for use in schools. Write to RTC Multi-Link, 110 Riviera Drive, Unit 10, Unionville, Ontario, Canada L3R5M1; or Berkeley Softworks, 2150 Shattuck Avenue, Berkeley, CA 94704.

Random Noise

There are some applications, especially in the area of scientific research, where BASIC's RND function just isn't random enough. I have heard that there is a way of generating random numbers on the 64 using the SID chip. I assume this involves PEEKing some location which holds a random value from 0 to 255. But I can't find this location. Also, how would I convert this output to a specified range—say, a random number from 1 to 10?

Mike Nichols
Kansas City, MO

Indeed, you heard right. Voice 3 of the SID chip can be used to produce random numbers, and with very little code.

In October 1988 "Feedback," we showed how to produce random numbers using this technique from machine language. Here's how to do the same thing from BASIC.

Somewhere near the beginning of your program, initialize the chip for random-number generation. First, set the frequency to maximum *so that the random-number value changes rapidly. Next, select the noise (or* random*) waveform and turn off the audio output so you won't have to listen to the noise.*

```
10 REM INITIALIZE VOICE 3 FOR
   RANDOM NUMBERS
20 POKE54287,255:REM SET VOICE 3
   FREQUENCY
30 POKE54290,128:REM SELECT NOISE
   WAVEFORM
40 POKE54296,128:REM TURN OFF
   VOLUME AND VOICE 3 OUTPUT
50 REM MAIN PROGRAM
60 LL=1:UL=10:GOSUB1000
990 END
```

Now, whenever you need a random number, just PEEK location 54299. This returns an integer value in the range 0–255. Since you want an integer 1–10, you must adjust this number so that it's in the proper range. The subroutine below does this for you. Before calling it, set the variable LL to the lower limit of the range and the variable UL to the upper limit (see line 60).

```
1000 A=PEEK(54299)/256
1010 X=INT(A*UL)+LL:RETURN
```

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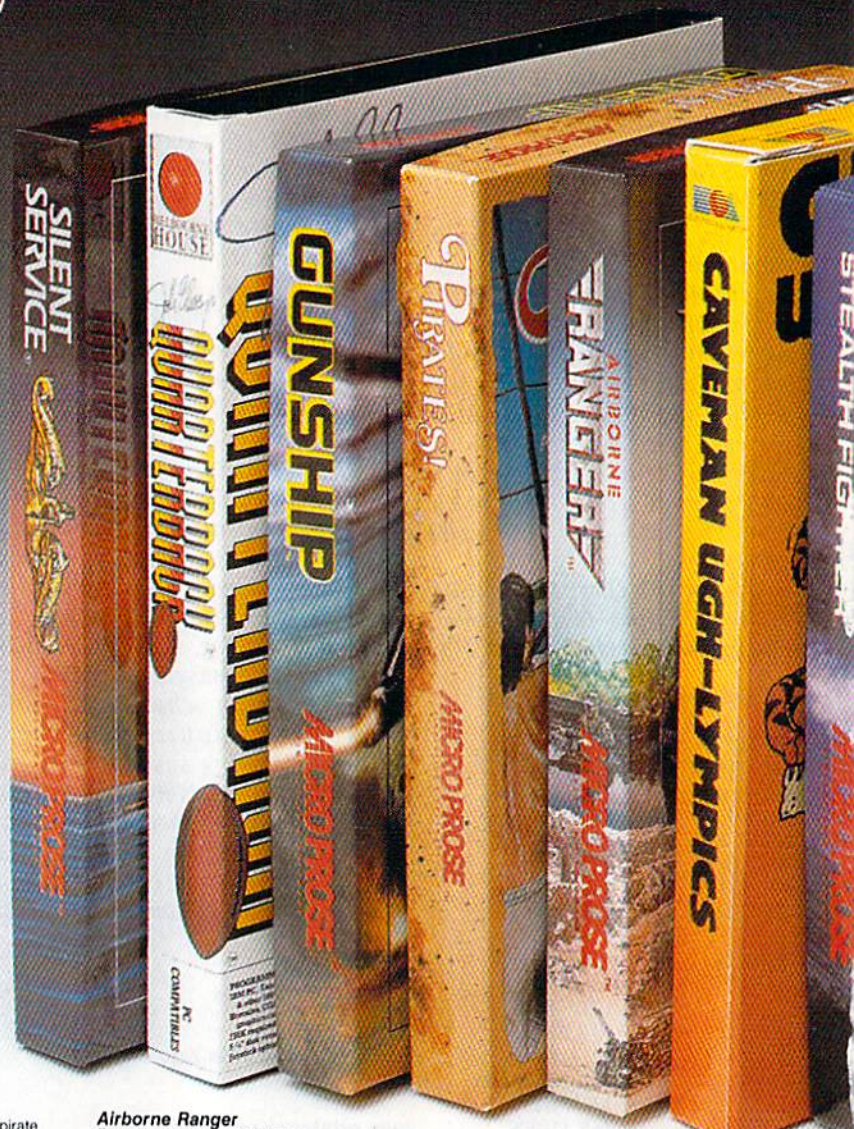

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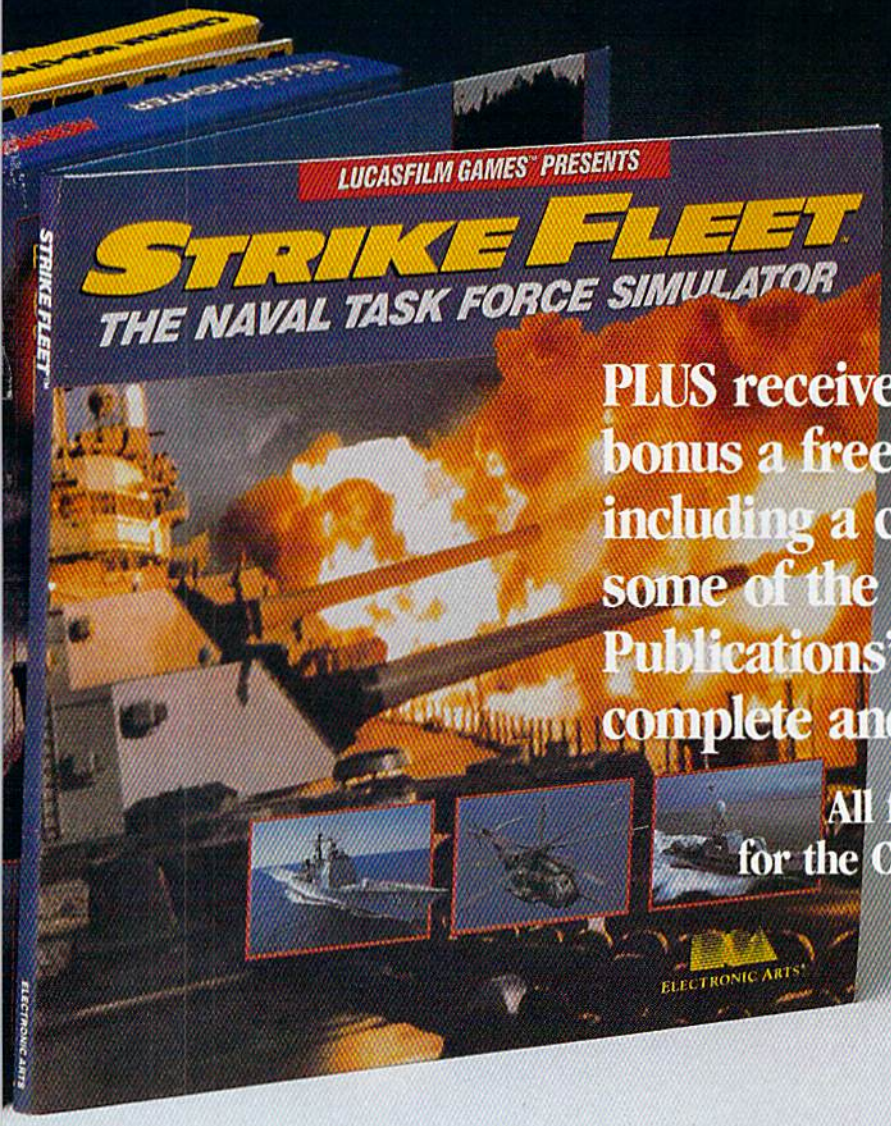

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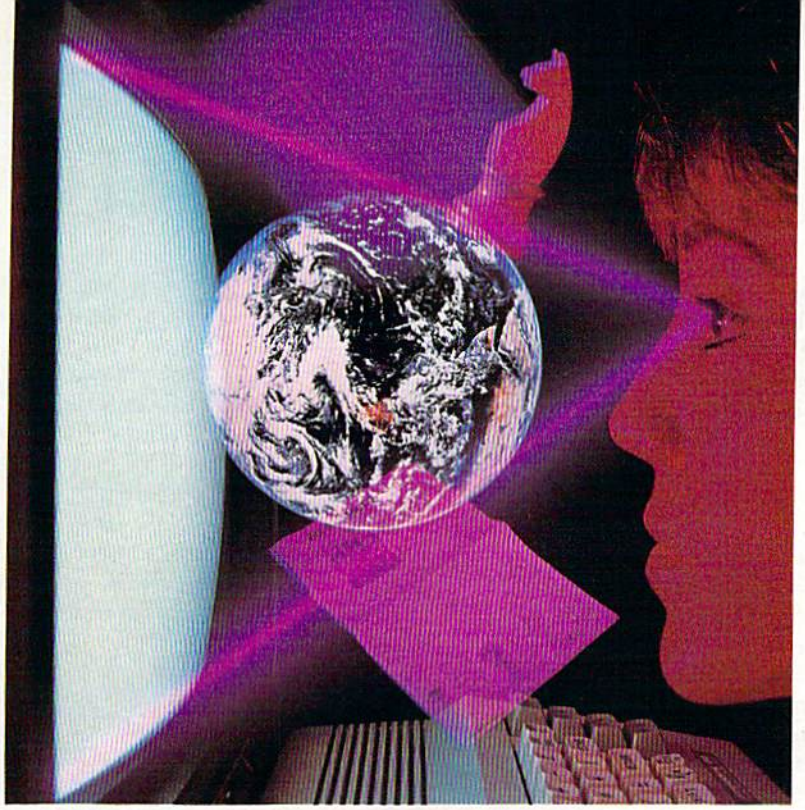


A Guided Tour of Major Online Services

Tom Netsel
Assistant Features Editor

Do you collect baseball cards? Play games? Travel? Read news? Shop? Invest? Chat? These are just a few things you can do from the comfort of your home with your computer, a modem, and a few extra dollars. Here's a look at each of the major online services and what they offer Commodore subscribers.

Arguably, the dullest piece of software is a terminal program. You may get a message saying it's activated, but in most cases the program just sits there—no whistles, no flashing lights, no invading aliens. But watch what it does when you plug in a modem and log on to one of the major telecommunications services.

Within seconds your screen comes to life with a world of possibilities. Tap your keyboard and buy a camera, check airline schedules to Rome, chat with other callers, battle invaders from space, play bingo or chess, read the latest news from China, research a term paper, get help with a program you're writing, or download free computer software.

All this and more is available to national telecommunications-service subscribers. Some services are available 24 hours a day, but most charge higher rates during the day or during prime-time hours. Other services are available only at night and on weekends, when connect charges are lower. CompuServe recently dropped its prime-time rate entirely, charging the same price for day or evening calls. Look for other services to drop or substantially reduce their prime-time rates as well.

If a service is in Virginia and you live in Arizona, don't worry about your telephone bill. The services maintain local phone numbers in most metropolitan areas or provide access through one of the telecomputing carriers, such as

Tymnet, Telenet, or Datapac (for Canadian subscribers).

Here's a look at the leading online services and their fees, and a rundown of the major features they offer Commodore subscribers.

CompuServe

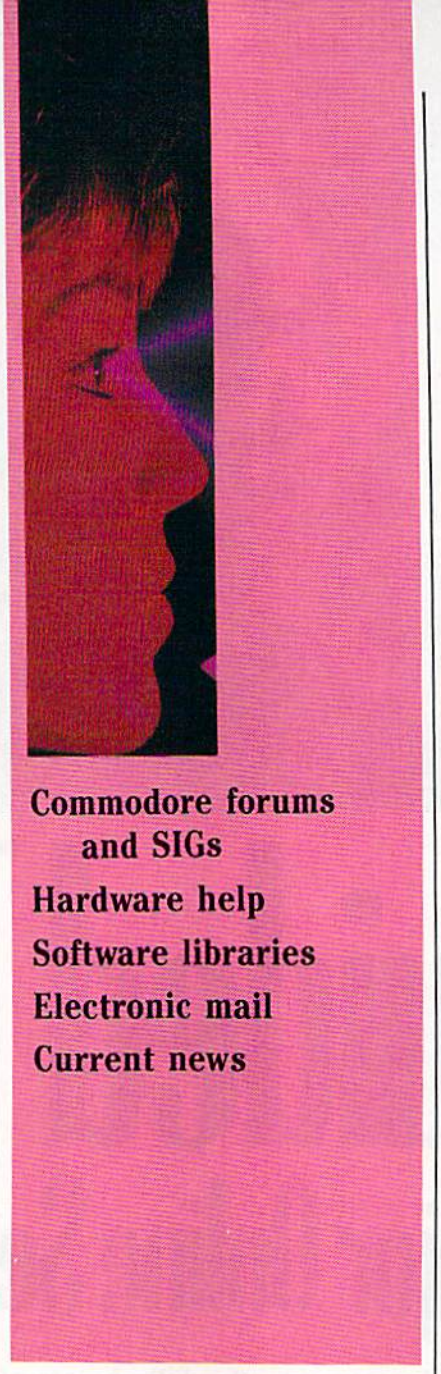
CompuServe calls itself the largest online information service, with more than 460,000 business and consumer subscribers throughout the world. CompuServe is so popular in Japan that arrangements are under way to establish a local telephone number to serve that country's growing list of subscribers, says Dave Kishler, CompuServe's supervisor of corporate communications.

CompuServe supports several Commodore forums, or special-interest groups (SIGs), dedicated to the 64 and 128. Each forum has its own message board, library of software, and conference area. The Commodore Users Network includes an Arts and Games forum, a Communications forum, a Programming forum, a Service forum, and a Commodore Newsletter.

If you have a question about Commodore equipment or a specific piece of software, you'll find other users ready to supply an answer. If you're having trouble getting a new word processor to work properly with your printer and interface, chances are others have experienced the same problem and are more than willing to pass along a solution. There's even a hotline to the Commodore factory if no one else can help.

In addition to computer-related areas, CompuServe has 150 other forums, covering such topics as aviation, entertainment, finance, health, sports, and travel. Each forum has its own library, message board, and conference area.

Sending written messages electronically is a popular feature on all the online services, and it's especially true with CompuServe's broad base of international users. But communication is not limited to CompuServe subscribers. CompuServe's electronic mail system, EasyPlex, is now tied into MCI and Telex. Log on to CompuServe, go to your EasyPlex mailbox, compose a message, and send it to any Telex machine in the world. By the time this issue appears, CompuServe will have added a worldwide fax link, allowing subscribers to transmit facsimiles of printed documents.



Commodore forums and SIGs
Hardware help
Software libraries
Electronic mail
Current news

CompuServe has a $39.95 registration fee. Charges are $6.00 an hour for 300-baud and $12.00 an hour for either 1200- or 2400-baud, 24 hours a day. CompuServe recently dropped its prime-time charges.

CompuServe, P.O. Box 20212, Columbus, OH 43220; 800-848-8199; Ohio residents, 614-457-0802

Delphi

Delphi continues to expand and enhance its numerous online services and features. Younger subscribers will want to check out their own conferencing and message base in a new forum called Person-Person, located in Delphi's entertainment area.

Other recent additions include a twice-weekly trivia contest called TQ!, an anagram puzzle called Scramble, and Immortality, an online adventure game. Subscribers play traditional board games as well as interactive and single-player adventure games.

Delphi's Commodore SIG for 64 and 128 users contains a library of public domain software for downloading, a message board, and a conference area. MANIAC is devoted to computer art and graphics. Artists post their masterpieces and download the works of others. If you have questions about any 64 or 128 painting or drawing program, MANIAC supporters can probably supply the answers.

Several SIGs are devoted to noncomputer subjects such as writing, theology, science fiction, music, movies, and aviation. Users with an interest in foreign languages may want to check out Terra Nova. This SIG, designed primarily for international callers, lists all Delphi menus and help files in five languages. Terra Nova also offers a translation service that is beneficial for many business subscribers. Menus and files are available in Japanese, French, German, Spanish, and Esperanto.

Merchant's Row offers subscribers online shopping, including access to Comp-U-Store, a discount shopping service. Going on a cruise to the Caribbean or flying to Hawaii this winter? The Electronic Connection provides a database for planning your vacation or business trip and offers discounts on cruise and airline tickets.

Delphi also offers callers complete financial news and reports, electronic mail, and two electronic encyclopedias.

Delphi's $49.95 registration fee

includes two hours of connect time. The non–prime-time rate for either 300-baud or 1200-baud is $7.20 an hour. The prime-time rate between 7 a.m. and 6 p.m. weekdays is $17.40. Premium services, such as Telex, fax, and some financial reports, carry a surcharge.

Delphi, 3 Blackstone St., Cambridge, MA 02139; 800-544-4005; 617-491-3393 in Massachusetts

Dow Jones News/Retrieval

Dow Jones emphasizes news and financial information for the business community and for consumers who want to access such information from their homes.

"The service is designed for the individual looking for information in the corporate sector," according to Dow public relations manager Carla Gaffney. "If a company is interested in tracking the competition, acquiring another company, or just checking a rumor, our service will help them."

You can search through more than 45 databases for financial information from the *Dow Jones News Service* and the *Wall Street Journal*. If you need to check back issues of the *Journal*, Dow Jones has complete issues dating back to January 1984.

Dow Jones' online information includes company profiles, statistical information, and financial information on 10,000 publicly held corporations. Information is supplied from such sources as Zack's Corporate Earnings Estimator, Insider Trading Monitor, Disclosure, and Investext.

Quick Search is a Dow Jones service that provides a full report on specific corporations. Compiled from multiple databases, Quick Search includes late-breaking news stories, a company profile, and complete financial information in one package. An online portfolio alerts subscribers to any late-breaking stories or announcements that could affect a firm's stock prices or earnings.

Although past performance can't guarantee future trends, investors considering a particular offering like to know its record. Trade Line, a recent Dow addition, provides historical information dating back 15 years on stocks, bonds, options, and mutual funds.

The Dow Jones registration fee is $29.95, which includes five hours of connect time. After the first year, there is a $12.00 annual fee. At 300-baud, the rates are 95 cents a minute between 6 a.m. and 6 p.m. and 20 cents a minute during non–prime time. At 1200-baud, the rates for those times are $2.09 a minute and 44 cents a minute, respectively; they go to $2.47 and 52 cents at 2400-baud.

Dow Jones News/Retrieval, P.O. Box 300, Princeton, NJ 08543; 800-522-3567

GEnie

"We have a significant number of new customers who have never used a computer before, never used a modem, and they're looking for help," says Bill Louden, GEnie's general manager. "If they have a question about their computer or a piece of software, they can go directly to our staff of experts and get an answer. GEnie is a great people-resource for consumers who have questions."

GEnie supports more than 60 RoundTables, and these SIGs include all major computer brands. Ask questions, post messages, access software libraries, or join conferences on a variety of computer-related topics. Commodore users will be particularly interested in GEnie's 6100 games, graphics programs, and utilities for the 64 and 128.

In addition to computer SIGs, GEnie has expanded its RoundTables to include such topics as photography, writing, science fiction, scuba diving, politics, games, education, and genealogy. Recent additions include religion and ethics, aviation, and radio and electronics.

The GEnie Mall has more than 40 merchants who sell wine, clothing, coffee, computer items, fishing supplies, and jewelry. One even provides quotes on new automobiles and accessories, information that will help you negotiate a fair price for your next BMW.

NewsGrid provides users with current stories compiled from 18 news services such as the Associated Press, Reuters, and China's official news agency, Xinhua. Specify key search words or phrases and quickly locate news, sports, business, or weather stories of interest.

GEnie offers stock quotes, travel information through American Airlines' EAASY SABRE reservation system, and a 40-channel CB simulation called LiveWire. GEnie has a special $50-a-month charge for unlimited access to LiveWire.

Stellar Warrior and Stellar Emperor are popular science-fiction games that offer a degree of complexity that should challenge the

avid game player. Other multiplayer games include flight simulators, chess, blackjack, backgammon, and Gemstone, a D & D adventure.

GEnie charges $35.00 an hour for access weekdays between 8 a.m. and 6 p.m. and $5.00 an hour during non-prime-time hours for either 300- or 1200-baud. There is a surcharge of $7.50 for 2400-baud. A one-time registration fee of $29.95 includes two hours of access time. By the time this article appears, GEnie may have announced a significant reduction in its prime-time rates.

General Electric Information Services, 401 N. Washington St., Rockville, MD 20850; 800-638-9636

PlayNET

If you're looking for games and you like to chat online with other 64 and 128 users, consider PlayNET. Designed exclusively for Commodore owners, PlayNET offers 11 online games that incorporate color and graphics, including chess, backgammon, and bridge, and three text-only games, bingo, poker, and blackjack.

Traditional multiplayer games have been enhanced for the 64 and 128 by the addition of color graphics. "You see a full-color chessboard on your screen," says PlayNET president David Panzl, "and your opponent sees the same thing. It feels remarkably like sitting across the table from the guy, and you can talk back and forth while you play."

PlayNET's menu makes it easy for subscribers to find their way around the system, which supports a variety of interesting SIGs. The CB simulation is especially popular, but keep an eye on the clock—chatting with other users is addictive.

PlayNET has a large library of public domain software available for downloading. Another library, the Software Trading Post, offers programs for sale that have been written by other users. Programmers upload their program to PlayNET and offer it for sale. If other subscribers download the program, PlayNET bills their accounts, crediting the full amount to the seller.

Conferences
Art
International links
Shopping
Travel reservations

Tutorials, message boards, game shows, online shopping, role-playing games, and live discussions are other popular features. PlayNET plays host to about 40 special events each week. Its forums tend to cover social issues, computer-related topics, and education. Trivia contests and games patterned after "The Dating Game" and "The Newlywed Game" are especially popular.

Like QuantumLink, PlayNET requires special software to take advantage of color graphics on the 64 and 128. These Commodore-specific systems compete more with each other than with the other ASCII services. Q-Link has more subscribers, but PlayNET has a dedicated following. "A lot of people tend to feel PlayNET is a friendlier system," Panzl says. "That has to do with us being a smaller system. I think people just get to know each other better on PlayNET."

PlayNET's $19.95 registration fee includes the necessary terminal software. A monthly maintenance charge of $12.00 includes three hours of access time. PlayNET is accessible between 6 p.m. and 7 a.m. weekdays and all day weekends for $3.60 an hour, 300-baud only.

PlayNET, 105 Jordan Rd., Troy, NY 12180; 800-PLAYNET

QuantumLink

Designed for 64 and 128 users exclusively, QuantumLink, like PlayNET, requires its own special terminal program. Its easy-to-follow menus are controlled by the function and cursor keys, eliminating the need for special commands. Downloading programs is especially easy. Although PlayNET and Q-Link resemble each other, their terminal programs are not interchangeable.

Q-Link provides guest speakers, special events, contests, tutorials, and live seminars. There's something scheduled almost every hour. Astronomy, foreign languages, cooking, human sexuality, baseball cards, trivia, and a teens-only club are just a few of its forums.

Hardware support groups, news, graphics, music, programming, CP/M, and games all have dedicated message boards, conferences, and software libraries for the 64 and 128.

People Connection is Q-Link's social center where subscribers chat CB-style. Up to 23 people can occupy a *room* at one time. Rooms have names that give users some idea of what to expect before they enter. If you don't see a room you like, you can open your own. Rooms called Teens Only, Girls Only, Argue with Me, Alternate Lifestyles, Over 30, and Sex are just a few of the popular gathering spots.

The Commodore Information

Network supports a hot line to Commodore, and representatives are often online to answer questions. GEOS information, updates, and patches are available from Berkeley Softworks. Electronic Arts, Brøderbund, and other major software companies often host online discussions.

QuantumLink, available only during non–prime-time hours and on weekends, has no registration fee other than the $9.95 software, which is supplied at no extra charge with GEOS and other software. Users pay $9.95 a month for unlimited basic service, plus six cents a minute for certain selected services.

QuantumLink, 8619 Westwood Center Dr., Vienna, VA 22180; 800-392-8200

People/Link

Talking with other users online is a popular feature on most systems, and it's no exception at People/Link. In fact, this division of the American Home Network offers 100 PartyLines for People/Linkers, or *Plinkers*, as they're usually called.

Commodore users will want to stop by several of the 22 Clubs and Forums to see what's happening with other 64 and 128 owners. In addition to the computer SIGs, if you have an interest in business, games, education, writing, or science fiction, People/Link has a SIG for you. There's also a group for teens.

Electronic Mail lets Plinkers compose, edit, and send mail to other users at the touch of a key. Subscribers upload letters, documents, binary files, or programs that have been written offline, saving on connect charges.

Plinkers buy discounts on cruises, tours, and other travel-related services and products. TWA's online TravelShopper provides information and reservations for airline tickets, hotels, and rental cars. Online shopping is another popular feature that's being expanded.

Financial information
Stock quotes
Research
Horoscopes
Film and book reviews

People/Link's registration fee of $15.00 includes a one-hour credit. Non–prime-time rates between 6 p.m. and 7 a.m. Monday through Friday and all day weekends are $4.95 an hour for 300- or 1200-baud and $11.95 for 2400-baud. Prime-time rates are $11.95 for 300-baud, $12.95 for 1200-baud, and $14.95 for 2400-baud.

Join the Frequent Plinker Club for $15.00. Club dues are $10.00 a month but members get a 25-percent discount on all rates. This can save you money if you are online more than eight hours a month at 1200-baud.

Plinkers who call via Telenet's PC Pursuit are charged $3.00 an hour, day or evening, at 300, 1200, or 2400 baud.

American Home Network, 165 N. Canal St., Suite 950, Chicago, IL 60606; 800-524-0100; Illinois residents, call 312-648-0660

The Source

The Source offers a wide variety of business and consumer online services and continues to update and enhance its databases and other features. Find answers to your questions about computer hardware, software, and applications from industry experts or subscribers who have faced similar problems.

Each SIG has its own message board, member directory, databases, and software files. The Source supports all major computer makes, in addition to offering SIGs for game enthusiasts, science-fiction fans, and business professionals.

CHAT lets subscribers converse with other members, and SOURCEMAIL handles the electronic mail. There is even an area for holding online business meetings.

The Source's bulletin board service provides more than 70 categories of online classified ads. Post messages or buy and sell items or services. An online shopping catalog offers bargains ranging from electronic equipment to sporting goods.

Stock-market reports, financial newsletters, and online portfolios are just a few of the investment opportunities on The Source. Other areas of interest include news, sports, weather, airline information and reservations, software and movie reviews, horoscopes, and the Grolier Academic American Online Encyclopedia.

The Source charges $30.00 to register and has a $10.00 monthly fee that applies to connect time. Prime-time access between 7 a.m. and 7 p.m. is 36 cents a minute for 300-baud, 43 cents a minute for 1200-baud, and 46 cents a minute for 2400-baud. Non–prime-time rates are 14 cents a minute for 300-baud, 18 cents a minute for 1200-baud, and 20 cents a minute for 2400-baud.

The Source Information Network, 1616 Anderson Rd., McLean, VA 22102; 800-336-3366

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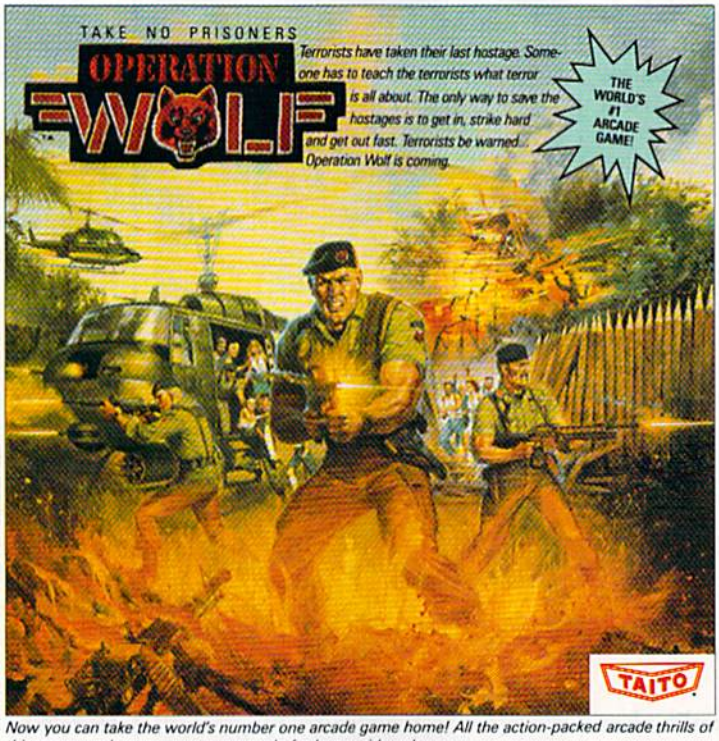

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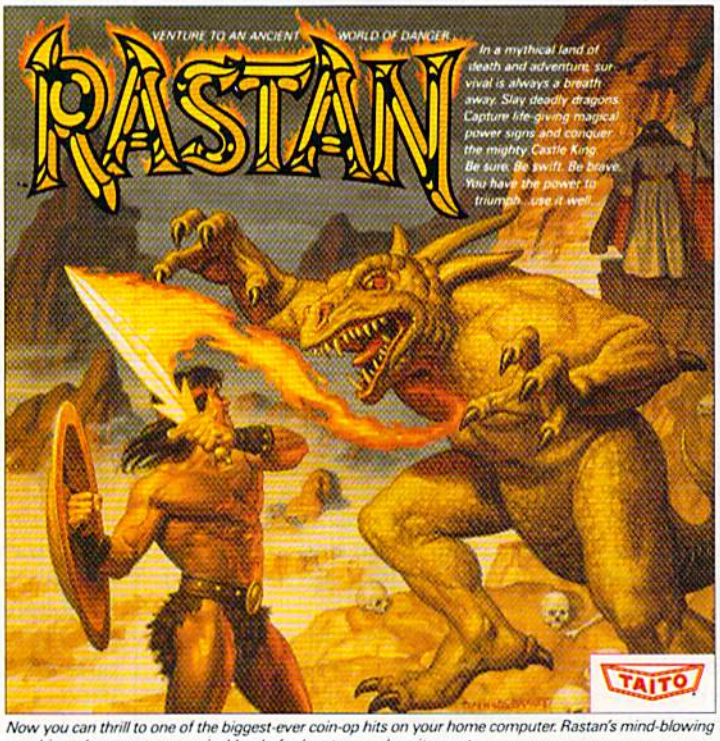

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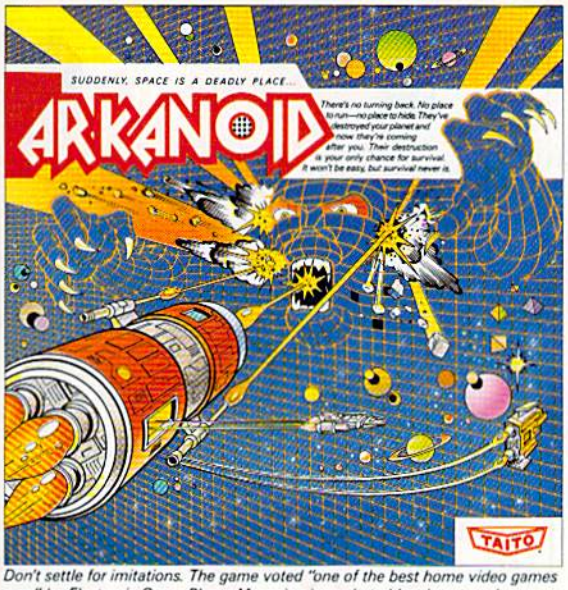

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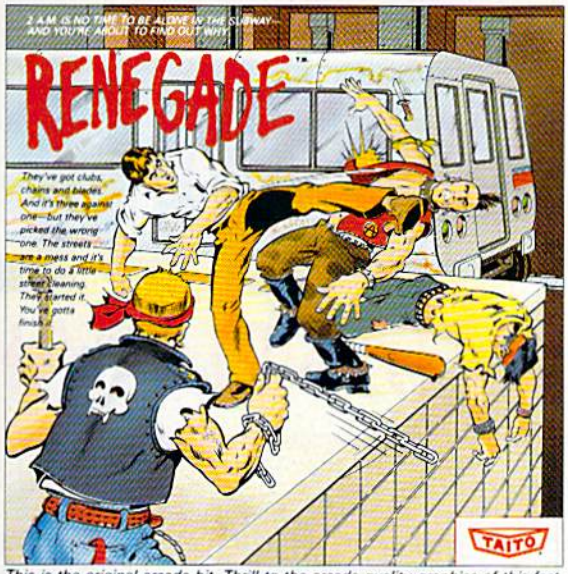

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HOW TO GET PUBLISHED (AND MAKE MONEY)

David Hensley, Jr. and Randy Thompson

Want to see your name in print?

Each year, thousands of people like you are getting their work published in computer magazines. COMPUTE! Publications alone publishes more than 150 programs each year. Where do these programs come from? Most of the time they come from you, our readers.

How you present your program is often just as important as the program itself. You can't just mail your program on disk to a magazine and expect it to be published (you'd be surprised how many submissions arrive this way). Although it may be the best thing since *SpeedScript*, without documentation and a cover letter, it's likely that your submission will be rejected upon arrival.

If you're serious about getting a program published, the tips in this article will help you on your way. From drafting the main article to preparing your software, it's all here.

Learn how to get your programs published by a computer magazine and make money programming. Here's the inside scoop on what magazine editors look for.

What Does It Do?

All submissions should include documentation. More than anything else, a program article must explain what the program does and how it's used. It's best to state what the program does in the first two paragraphs of the article, and then explain how to use the program.

Try to make your instructions as easy to follow as possible. That way, all users—from beginners to experts—can benefit. Before you start writing, study articles from the magazine you're planning to submit to. By looking at previously published articles, you can judge such considerations as article length, style, and other things relative to your program.

More than anything else, your article should be informative and clearly written. Editors are more concerned with the content and readability of an article than with its style.

The first page of your article should contain the following information: your name, address, telephone number, the title of your

program, and the date of your submission. Also, list the program's requirements. Does it require a joystick? Does it need a printer? Does it run in 80-column mode on the 128?

Ideally, articles should be typed or printed on a printer. Handwritten articles are difficult to read. All lines within the text of the article should be double- or triple-spaced. If you use a word processor to write the article, send a copy of the article on disk in ASCII format. Most word processors provide an option for saving a document as plain ASCII text or in unformatted form (Commodore ASCII is acceptable). Here at *GAZETTE*, we welcome articles written in *SpeedScript* format.

Take the time to write a short cover letter to accompany your article. Cover letters help identify a submission. Your cover letter should explain that the program is a submission, and then it should describe briefly what the program does, why it's useful, and who would use it.

Presenting the Software

Documentation is important, but the most crucial element of a program submission is, of course, the program itself. Avoid submitting programs that cover narrow topics or ones that require obscure hardware devices. Editors and submissions reviewers look for programs that contain new and original ideas, but, to be accepted, the program must also appeal to a broad audience.

Program size is another consideration. Most publications list their program submissions within the magazine, making it impossible to publish extremely long programs. As a general rule of thumb, BASIC programs should be no more than 15K in length, and machine language programs should be no more than 5K.

Want to catch the magazine editor's attention? Include a demonstration program. A demo also saves an editor's time—something almost all will appreciate. And a demo gives the evaluator an immediate idea of what your program is and what it can do.

The longer it takes to get your program up and running, the less likely it is that it will be bought. This is especially true of utilities. If your program uses or requires certain files, such as hi-res pictures or text files, provide those files on your disk. Machine language programs should be accompanied by source code.

DO

- State what the program does in the first two paragraphs of your article.
- Save your article on disk in ASCII format.
- Provide a cover letter.
- Include a demonstration program.
- Keep a backup of your disk and a copy of your article.

DON'T

- Send in a program without providing documentaion.
- Forget to include your name and telephone number, the title of your program, and the date of your submission on your article or cover letter.
- Submit a program that requires the use of an obscure hardware device.
- Send more than one submission in an envelope.
- Submit a program to more than one magazine at a time.

Supply and Demand

What type of software is in demand? Games, educational programs, and short, original programming utilities. Here at COMPUTE!, we're continually swamped with sprite editors, DOS-enhancement programs, and specialized databases (bowling secretaries, record collections, videotape filers, and so on). Utility programs are fine, but computing should be fun as well as productive. Every time we receive a quality game, such as "Arcade Baseball," "Basketball Sam & Ed," or, more recently, and in this issue, "Crossroads II: Pandemonium," we snatch it up. It's the same with educational programs. Commodore computers are widely used in schools and in homes with children, yet good educational submissions are rare.

To fine-tune your submission, request a copy of the magazine's author's guide. This guide will give you a more detailed description of what the editors expect to see. Author's guides are not intended to serve as a directory of what types of programs a magazine is currently seeking—that changes too often and is influenced by a variety of factors—but it's meant to remind you of form and style of articles and program submissions.

It's in the Mail

There are several things to consider before you drop your submission in the mailbox. Publishing companies receive a tremendous amount of mail. It's always possible that some will be temporarily misplaced or misguided. Although these situations are rare, it's a good idea to make a backup of your disk and a copy of your article before mailing them.

Package the submission securely. Large-sized office envelopes seem to work best. To avoid damage, place your disk in a disk mailer or tape it between two thin pieces of cardboard. To ensure that your article is directed to the correct person, address the envelope to "Program Submissions Reviewer."

Before sealing the envelope, check to make sure everything is included. The package should contain the following: a disk that contains at least two copies of the program, an article, a cover letter, and a self-addressed, stamped envelope. Screen shots, photos, and artwork are not necessary, but in some cases they're helpful. Do not send more than one submission per envelope, and be sure to provide the correct postage.

The next step is simply to wait. Most magazines reply to submissions within 4–8 weeks.

Getting Published

Getting a program published can be a rewarding and satisfying experience. There's a certain pleasure in seeing your name in print. Besides, getting a program accepted by a computer magazine means money in your pocket. And what better way is there to share your work with the world?

With a little ingenuity and the tips listed here, you, too, can be a published program author.

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Pool of Radiance

Dungeons and Dragons virtually created the entire genre of role-playing games. In these games, you typically become a character in a fictional world, trying to stay alive to gain wealth and experience as you move from adventure to adventure.

Even from its beginnings as a board game, D & D quickly expanded its influence. The publisher, TSR, added books of rules; coined a new name, Advanced Dungeons and Dragons (AD & D); and watched the games become a cultural phenomenon. Groups of teenagers, almost exclusively boys, spent entire summers playing the game, and more than a few college students sacrificed their studies to take part in endless D & D sessions. The newspapers were full of sensational tales of youthful obsession, many based on stories that were almost certainly apocryphal. School boards banned it, parents forbade it, and—quite naturally—the game's popularity increased as a result.

All computerized role-playing games have their roots in the AD & D board games, including the text adventures and even some simulations and arcade games. If you've played *Wizardry, Bard's Tale, Phantasie, Wasteland, Ultima, Zork, Beyond Zork, The Pawn, Starflight, Star Commander, Road Wars,* or one of many, many others, you have experienced Dungeons and Dragons' influence.

AD & D itself has never been computerized, at least not in a licensed version. Banking on its considerable reputation with the war-gaming hobbyists, SSI has released the first of a projected line of licensed AD & D products. SSI's intention is obvious: to bring AD & D to the computer in a faithful, competent, and intelligent manner. To that end, SSI plans a series of adventure games, action games, and Dungeon Master's aids.

Pool of Radiance, a role-playing adventure, kicks off the whole thing. Released first for the 64, the box is packed with four disks (not copy-protected), a code wheel (which provides the copy-protection), a 30-page rules manual, a 40-page adventurer's journal, and a 4-page quick-start card for 64 users. The quick-start card lets you jump right into the game, but, before long, you'll want to settle back and study the other booklets.

As in most role-playing games, you begin by forming your party of adventurers. Once this is done, you send your party out into the ruined city of Phlan. In the small, civilized part of Phlan, you'll find shops to buy equipment and goods, a training ground for furthering skills, several temples and taverns, and a city council for receiving news and missions. Civilized Phlan also has a dock area, where you can catch a ship for the Sorcerer's Island. The main screen display shows the world from the character's point of view, looking straight ahead down a street or corridor. Other views include an overhead area map and, when applicable, a wilderness map.

After visiting the city council and receiving a mission, you begin by taking control of Phlan from the monsters and evil characters. First stop is the slums, which you work block by block, gaining experience and treasure as you go. With inexperienced characters, you'll have to leave the slums after defeating each group of enemies; later, you can explore and clean out additional blocks without having to go back each time to the civilized area.

Of course, you'll find items in the slums that will help you later. When the slums are finally cleaned out, you go back to the city council, collect your praise and rewards, and receive a commission for another adventure. You'll find other opportunities listed on the walls outside the council or by overhearing rumors in the taverns or from characters you meet. Missions include ridding the swamps of lizard men, preventing a band of nomads from attacking Phlan, discovering the source of river poisoning, and rescuing an heir. As you might guess, none of these is easy.

In keeping with AD & D's origins in war gaming, *Pool of Radiance*'s combat is quite elaborate. When you join a battle, the display becomes a battle display. You can set the computer to control any or all of your characters in combat, or you can take control of as many of them as you want. Taking control means moving them into position against the enemy and directing them to attack or defend in various combinations. Characters can aim at specific targets, change weapons, bandage injured party members, turn undead enemies away from the party, use items, cast spells, and so on. Of course, all this takes time, especially when fighting a large group of enemies. As I write this review, my 128D is running through a computer-controlled battle of six characters against many orcs, and the fight has taken 20 minutes to execute. If you control all your characters individually, expect battles to run as long as 60–90 minutes.

To judge *Pool of Radiance* fairly, we need to ask two questions. First, how does it fare as a recreation of the AD & D gaming system? Second, how does it fare against its competition in the computerized fantasy role-playing genre? The rest of this review will concentrate on those two questions.

Pool of Radiance does not attempt to recreate all of the rules of AD & D. What it does, instead, is concentrate on the "feel" of the parent game. For example, there are only six character races available—dwarf, elf, gnome, half-elf, halfling, and human—but these represent quite well the kinds of races possible in AD & D and its offspring. There are also only four classes—cleric, fighter, magic-user, and thief—but again the range is represented. The game uses AD & D's alignment system, with the program keeping track of whether or not the characters act according to their moral guidelines.

Because they demonstrate most clearly SSI's commitment to the AD & D model, character creation and the use of magic deserve special mention.

Creating a character involves several steps, which the program guides

you through. First, you choose the character's race; then you choose the gender. Next, the screen shows a value (up to 18) for each of six characteristics: Strength, Intelligence, Wisdom, Dexterity, Constitution, and Charisma. You can keep these characteristics, or choose Roll Again to generate new ones as many times as you like. Then you select the character's class. In the case of nonhuman characters, combinations are possible: a half-elf, for instance, can be anything, including a combined fighter/magic-user/thief. Next, you select the character's alignment, and finally you give him or her a name.

So far, this is the standard procedure for creating characters in an AD & D game, but this next step is both new and impressive. A picture of the character appears in the top-right corner of the screen. You can then choose from a variety of heads and bodies, customizing your character's appearance. The only drawback is the amount of time needed to load the individual graphics from the disk (this could have been smoother), but the idea is very good. After selecting the appearance, you then design the icon for the character, as it will appear on the battle screens. You can choose from several weapons and stances, as well as individual color for arms, bodies, and so on. It's a nice touch, and it allows you to identify the characters as they enter the battle display.

You can also cast magic spells. One method is to memorize spells, which are forgotten when cast, as in AD & D. Magic-users can enter spells in a spell book and cast them using a Read Magic spell. This spell is also used to cast spells from a scroll. Unlike magic-users, clerics pray each day to get their spells; as you might expect, clerical scroll spells can only be cast by clerics. You'll also find that spells do not always succeed.

Overall, how does it compare? *Pool of Radiance* comes with the built-in legitimacy of AD & D, so role players new to the electronic version, especially those with AD & D experience, should probably start here. As the system evolves, incorporating more AD & D features, it will become increasingly appealing to a crossover crowd. The adventure plays well, maintains interest, has a well-designed interface, and takes a long, long time to complete. In other words, it's like most other computerized role-playing games.

But is it better than *Bard's Tale?* Or *Ultima?* Obviously, that's a matter of personal opinion. On the 64, *Pool*'s disk access is much too slow, but that's true of the other two games as well (to say nothing of *Wizardry* or *Alternate Reality* on this system). Certainly, *Pool of Radiance* includes too much fighting and not enough character interaction, but only *Ultima* has made definite steps towards easing that problem. *Pool*'s combat system is clearly too time-consuming, but for some it will address an omission on the part of the other games. All in all, SSI's first AD & D product holds up well against its impressive competition.

It will be interesting to watch the system develop. *Bard's Tale* and *Ultima* have both undergone substantial improvements, and *Pool of Radiance* will likely go through the same process. Will future adventures add more AD & D features? If so, will they vary with each adventure? Will character classes, races, and magic spells grow in number in an effort to keep the AD & D players happy, or is the system basically set? Whatever the outcome, AD & D players have a fascinating package to examine and explore. *Pool of Radiance* won't satisfy them completely, but it represents a good and significant start.

—Neil Randall

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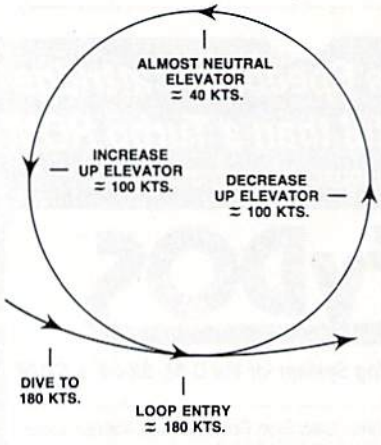
Flight notes # 3A

Better Loops with Flight Simulator - While the "Flight Physics" manual description is adequate for most, we get enough calls from frustrated computer pilots unable to perform a loop to warrant the following additional instructions. For those already successful at looping the aircraft, these instructions should help make your loops rounder and more satisfying.

After diving to the suggested looping airspeed (180 knots will do), add as much up elevator as possible without stalling the aircraft. As you pitch up and airspeed slows you will have to reduce some of this elevator pressure. Many people leave the elevator setting on high and become frustrated when the aircraft stalls before pointing straight up. In a perfectly round loop your elevator should be almost all the way back to neutral by the time you're upside down. Since airspeed is very slow at the top of the loop (and the portion of the circle traveled is small), your pitch attitude change should be gracefully slow as well. Start adding up elevator pressure again as airspeed increases. By the time you get to the bottom of the loop, the up elevator setting should be where it was when you began the maneuver and your airspeed should be adequate to begin another loop.



In summary, up elevator setting varies throughout the loop. The faster your airspeed, the greater the up elevator pressure. Flight Simulator is the only simulation on the market that accurately portrays the flight characteristics of a light aircraft when performing this maneuver. In reality there's little room for error in the amount of up elevator you can use, and meeting the challenge of performing a perfectly round loop can be a very satisfying experience. You may even find yourself more knowledgable about loops than many non-aerobatic pilots who fly real airplanes. Happy trails!

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Bubble Ghost

Well, I can't help it if you've never heard of a bubble ghost. Everyone else knows that ghosts spend their time blowing bubbles. If you didn't take in this bit of wisdom along with your strained baby food, then blame your parents.

Actually, ghosts don't blow bubbles. They create bubbles from soapy water, or whatever that stuff is, and use their ghostly breath to push bubbles through 35 rooms (or levels) of a dank and moldy laboratory. The ghost must complete the hazardous course before he can find eternal rest. At any rate, that's what it says in Accolade's documentation for its new game.

Blame the bubble ghost for the game's hazards—the apparition is the spirit of a crazy inventor who haunts his own laboratory. He filled his lab with crazy inventions, and, for some strange reason, they all have sharp edges. (Maybe it was one of his inventions that got him into this mess.) It's up to you to help him blow his bubble under, over, around, and through 35 levels of insanity.

At the start of the game, you'll be presented with a menu for choosing options for one or two players, sound on or off, and a practice mode that works with any level except number 35. My knowledge of the various obstacles comes almost exclusively from this last option and from watching my children play the game. I prefer not to say which level I reached on my own, but with the same number of dollars, I wouldn't expect any change back at McDonald's.

As the game begins, you find the ghost and a bubble floating in midair at the right side of a room with stone walls. Press your joystick's fire button, and the ghost puffs his cheeks and blows the bubble across the room toward an opening. One puff won't be enough, and you'll have to follow the bubble by moving your ghost with the stick.

As you go through the opening, you'll see your score advance. You get bonus points based on how few bubbles you used, whether you caused the ghost to blow so hard he got red in the face, and how much time it took to complete the level.

The first room is easy enough. Accolade starts you there to get you familiar with the game. From then on, prepare for frustration.

In the next room, a spinning object is in your path. You may be good enough to pass over it just at the right moment. It's possible, but not likely. Instead, rotate your ghost 90 degrees, move him under the bubble, and blow the bubble upward. (If you rotate in the wrong direction, you'll find yourself blowing at the floor. Not only is this counterproductive, but it also makes you look stupid.)

If you blow too hard, the bubble will hit the ceiling and burst. So be ready to get above it and blow it downward. (Yes, I realize that now you're blowing toward the floor, but this time it's necessary.)

If the bubble touches anything, it will burst. The fact that many rooms have sharp objects means little, except for its psychological effect. You could just as easily pop your bubble against a down pillow as an industrial drill bit.

More meaningful hazards come in the form of electric fans that can alter your bubble's course. To test your timing skills, you'll encounter rooms with extremely narrow passages and intermittent laser beams.

At the start of the game, you receive six bubbles. Break a bubble, and you get another one, until you've depleted your supply of six.

At the end of a game—which comes very soon for some of us over the age of 13—you'll have the chance to type your initials next to your score on a hall-of-fame board. *You* may have the chance, though I never did. My children, Mike and Kelly, filled the board with ridiculously high numbers that didn't give their father a ghost of a chance.

That's *Bubble Ghost*. It's distinguished by good graphics; good animation; a theme song that, thankfully, can be toggled off; and a delightful ghost with a good range of expressions. It's fun, frustrating, silly, challenging, ridiculous—all the things that make pure arcade games worth playing.

One note of caution: Animation and graphics of this quality use most of the memory locations of your 64; you'll probably need to disconnect your printer and/or second disk drive before the game will run.

—Ervin Bobo

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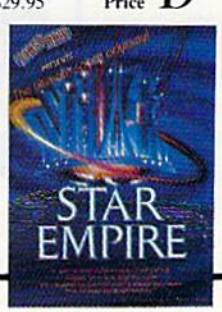

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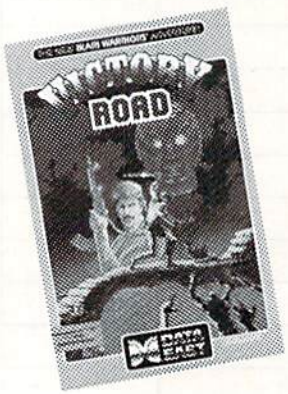

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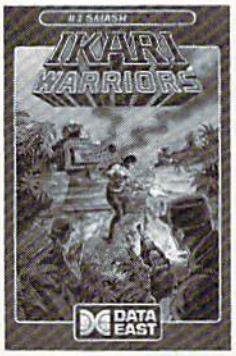

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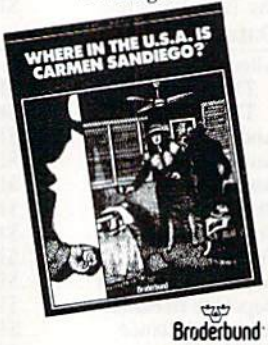

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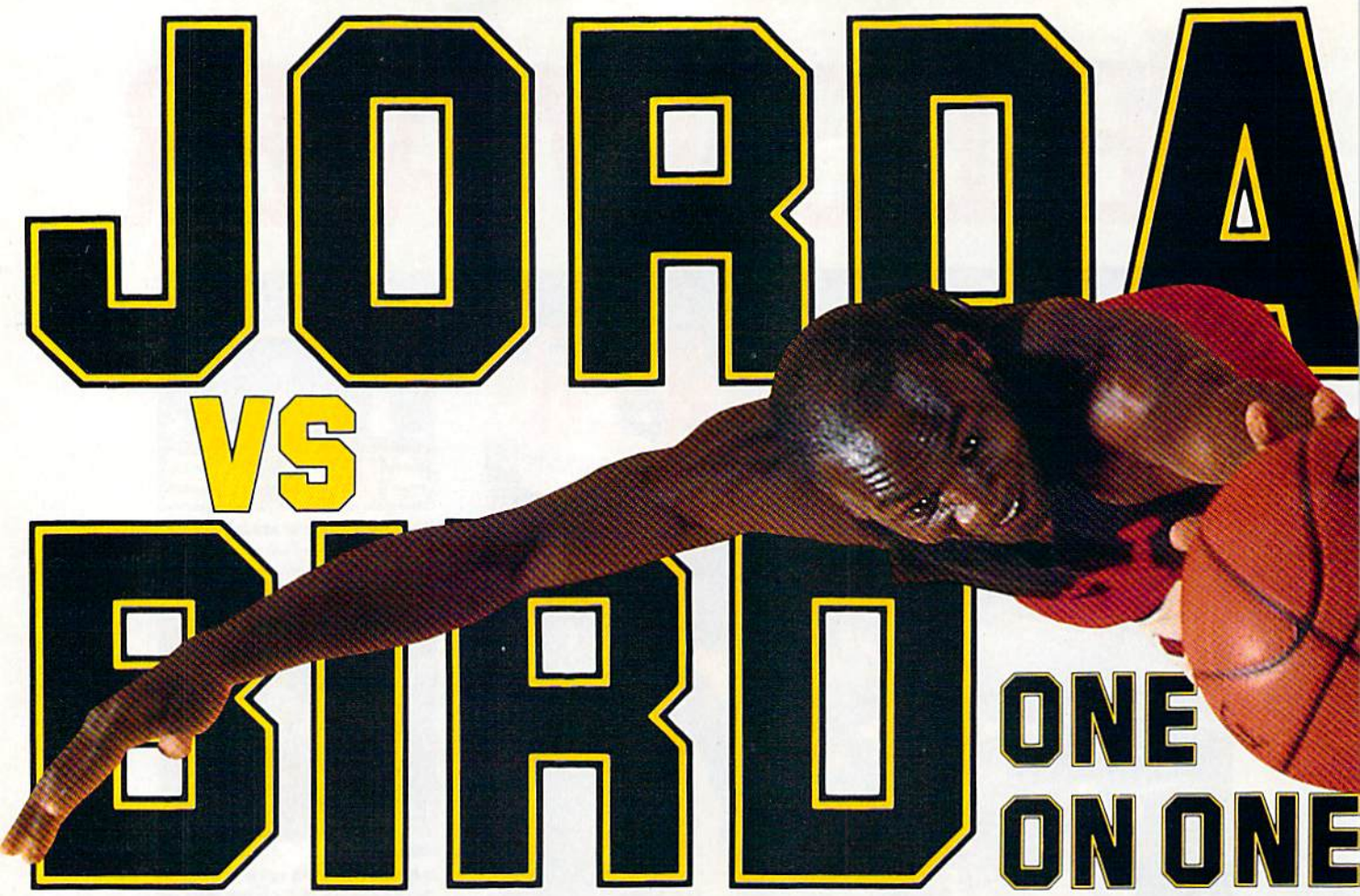


Mavis Beacon Teaches Typing

Unlike its typewriter counterpart, a computer keyboard is connected to a device capable of acting as a typing instructor. Software Toolworks takes full advantage of this capability in *Mavis Beacon Teaches Typing*.

Combining solid instruction and reinforcement strategies with smooth animation and entertaining lessons, *Mavis Beacon* provides a pleasant environment for acquiring or honing typing skills. The depth of its lessons is impressive, from the variety of words in even rudimentary drills to entries from *The Guinness Book of World Records*. *Mavis Beacon* can be tailored to any skill level and is filled with many thoughtful extras and asides that enhance the illusion of personalized instruction. For example, for young typists, rhymes and riddles serve as diverting drills. The illusion of personality is so complete, in fact, that I find myself referring to Mavis as though she were real.

The command interface evidently received as much care as the instructional aspects. Drop-down menus are used to good effect here, simplifying movement among the many modules and options. Both overall program and lesson-specific menus can be summoned at any point by way of consistent, minimal commands. I would, however, appreciate a list of available lessons—home-row keys, top-row keys, and so on—from which to select. Other needs and requests have been anticipated. A formatted data disk is required for storing your progress—acting as Mavis's gradebook, as it were—and a format command is part of the introductory menu.

At startup, you are asked to introduce yourself; afterward Mavis includes your name in her lessons. You must also rate your typing skills by one of several broad categories, from Beginner to Advanced. A fairly smart program, *Mavis Beacon* adjusts the difficulty of your lessons to suit your abilities.

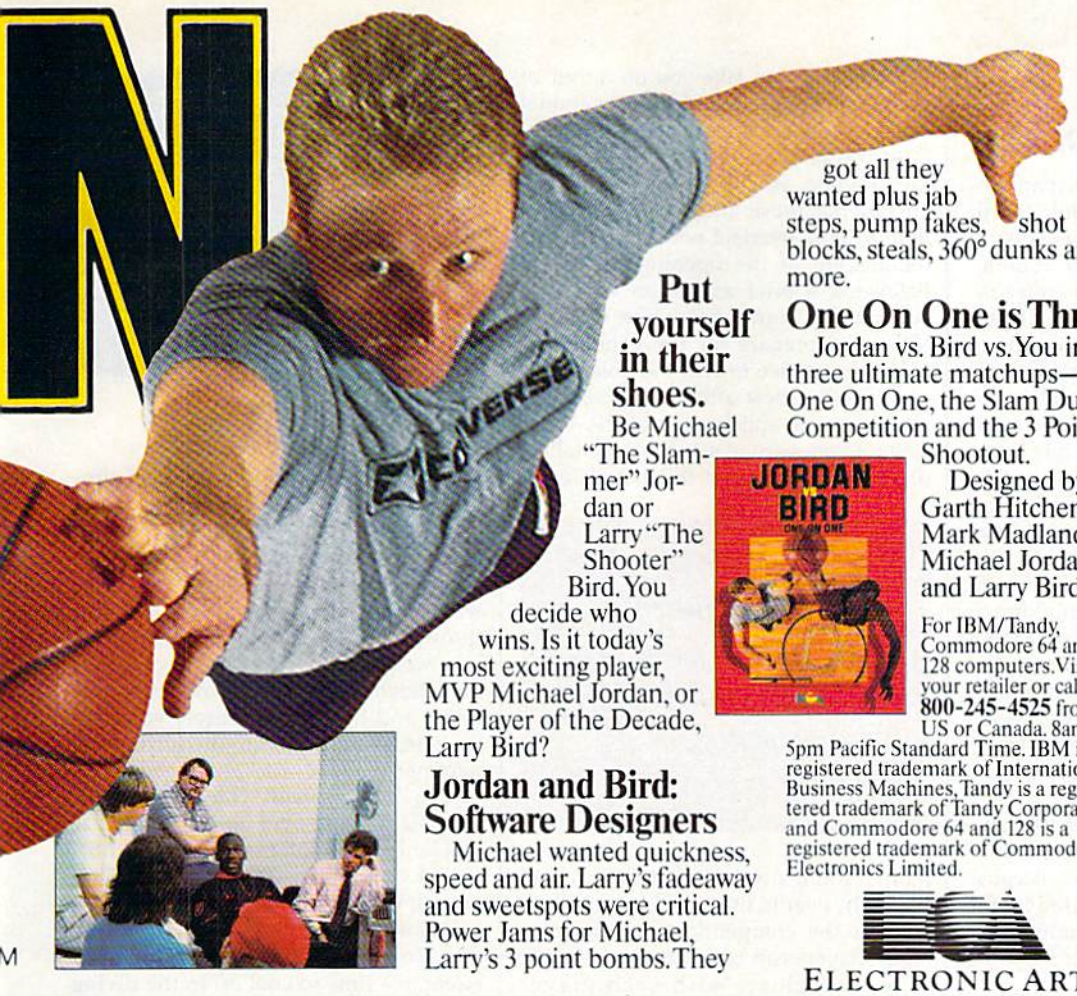
At the lower levels, a sound balance is struck among the lecture, practice, and drill categories. Beginners are first introduced to the home-row keys—*a* to the apostrophe—the most important on the board. Tutorials consist of text screens, designed to resemble blackboards, telling which finger serves which key.

Those keys, in turn, are practiced in the classroom, which is where *Mavis Beacon* really starts to shine. A 64 keyboard and screen appear, with shadowed fingers at rest on the home-row keys. You are prompted to type a particular key with the correct finger. As you do, the shadow typist strikes the same key. (The shadow, needless to say, always uses the correct finger.) Thanks to excellent animation and a well-designed screen, this section of the program makes learning finger placement and keyboard layout as painless as possible.

I particularly like the fact that the classroom can be called up exclusive of specific lessons. This is a convenient feature worth leaning on for those keys your fingers just don't want to remember.

Actual drill takes place in the workshop, where more specialized tools are added to the basic classroom display. These include meters which register speed, accuracy, and progress toward completion of the current assignment. A metronome is available for setting the proper typing pace. Drills consist of real words, with numbers and punctuation marks added as your abilities increase. The instruments flank the lesson screen but don't distract from it—unless I'm really off the mark, at which time I only have eyes for the gauges.

At the end of each drill, your results are posted, showing your words per minute (wpm) along with accuracy and an adjusted wpm to reflect your errors. When the program determines that you could do better, it gently suggests that you try a drill again. Recurrent errors can be addressed through



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A more technical picture of your skills—or lack thereof—is available via Mavis's graphs. Here, bar graphs display your relative levels of facility with each key, the keys with which you are most familiar, and so on.

With records for each session stored on the data disk, a cumulative picture of your progress quickly accrues, and the acuity of Mavis's insights into your typing increases. With more data, Mavis is better able to customize lessons aimed at solving problems. As the program's admirably literate and thorough manual points out, there are many categories of typing errors, including poor accuracy, dropped letters, mistyped keys, transposition of letters, and more. According to the manual, Mavis analyzes your typing through 30 different "yardsticks," keeping an eye out for the error areas mentioned above, along with 15 other error categories. The program quickly identified and focused on my particular typewriting shortcomings and also caught deliberately created error patterns.

When drill becomes tiresome, the classroom can be abandoned in favor of the arcade. This turns typing into a fast-paced road rally, with your progress determined by the accuracy and speed of your typing. Mistyped keys earn a nice splat of something on the windshield. After the race, your results are available in a variety of formats. As typing games go, this is a nice one, well animated and colorful; still, it was my least favorite section of the program.

Mavis's higher levels might challenge even experienced typists. Here, a default rate of 60 wpm is supported by a madly ticking metronome. Keys are shown being depressed, but the shadow hands are gone. The words thrown your way are maddening, too. In one exercise I encountered *intumescence, arboretum, inundated,* and dozens more multisyllabic Latinate words selected to send my fingers all over the keyboard.

The further you progress into Mavis's store of teaching tools, the more practical the tools become. Fundamentals of computer keyboards are addressed. You are shown proper page setup for single- and multipage letters and documents. *Mavis Beacon*'s handsome, oversized manual includes several sample letters for typing. A whole section of the manual and, more importantly, of the software, addresses proper résumé format.

Mavis Beacon's manual is a model of documentation. In addition to thorough coverage of the program's goals and methods—with Commodore operational specifics on a reference pamphlet included in the package—the manual contains an elegant, literate history of typewriting. The history makes fascinating reading, highlighting the many attempts to perfect mechanical writing machines. Among the anecdotes is an account of Mark Twain's interesting, and typically cantankerous, role in typewriter development. A bibliography includes both historical and technical references; sections of the manual and the bibliography deal with the Dvorak keyboard, which many adherents feel is superior to the standard QWERTY.

This is a large program, filling both sides of two disks. As a result, there's a fair amount of swapping during setup. Loading the program takes time even with a fast-load cartridge, but the wealth of entertaining instruction makes the wait more than worthwhile.

I've waited, in fact, for a couple of decades and a few million words of published work to shift from a proprietary three-finger typing system to a sensible ten-finger one. What I was waiting for, it turns out, was the right typing teacher. *Mavis Beacon* is that teacher.

—Keith Ferrell

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The Games—Summer Edition

Like most Americans, I participated in the Olympic Games in Seoul, South Korea, only by watching the events on television—sitting in the comfort of my sofa or standing on top of my coffee table, depending on the pace of the action. Now that the roller-coaster ride of emotions is over, my coffee table is safe for another four years—or is it?

To the delight of coffee-table manufacturers everywhere, Epyx has introduced an Olympic simulation, *The Games—Summer Edition*. Although Epyx has produced other interactive Olympic games, this latest version may be its best. I didn't expect to be impressed with *The Games*, thinking it would probably be a copy of Epyx's earlier hit, *Summer Games*. Instead, I discovered a sports game that captures the spirit and emotion of the XXIVth Olympiad, distilling the Olympic ambiance into two double-sided disks and a companion coaching manual.

Buying this game is a lot like purchasing a commemorative coin as a keepsake of the recent games. Because the software is officially licensed by the United States Olympic Committee, future U.S. athletes will benefit from the sale of the product.

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Allow me to take you on a tour of this computerized world of international camaraderie, sportsmanship, and world-class competition. After you've loaded the program, you're greeted with pleasant Oriental music and a pictorial map of South Korea overlaid with photographs reminiscent of the opening ceremony. Following a brief animation sequence, you quickly move on to the Olympic Village to prepare for the competition and your chance to win the gold.

Like the best athletes, you should practice your sports vigorously, especially if you want to stand on the tallest of the three blocks at the awards ceremony. You'll need to practice each of the eight events time and again before starting the competition. As many as eight players can compete for Olympic fame and glory, with each player choosing to represent any of 18 countries. Multiple players can also choose to compete as a team under the banner of one nation.

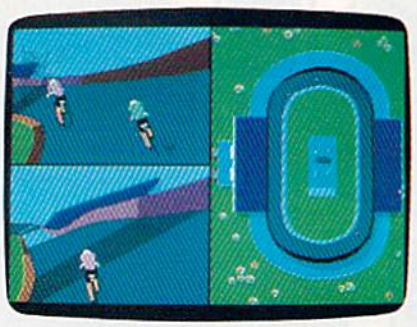
I didn't expect to be impressed. Instead, I discovered a game that truly captures the spirit and emotion of the XXIVth Olympiad.

The enclosed coaching manual explains the joystick moves you'll need to master for both practice and competition. The manual also gets you into the spirit of the games with true stories of past Olympians and great moments in Olympic history.

A quick tour around the gymnasium reveals two very difficult events—difficult even for the best of athletes. The uneven parallel bars and the rings require your steady concentration as you put together and perfect your gymnastic routines. With persistence, a perfect 10 is possible. I came nowhere near this score, even when I assumed the role of a Soviet gymnast.

In the velodrome, the 1000-meter cycle sprint pits two players against each other, or one player can race a computer opponent. Drafting techniques and strategy help you conserve energy for the all-important bell-lap sprint to the finish. The monitor screen is split in half so you can view the race from cycle level and from a bird's-eye perspective.

Over at the track, the hurdles event requires you to clear ten 42-inch-high hurdles over the course of 400 meters. To run well, you'll need speed, spring, and timing. Your computer opponent is swift and sure, but you can overtake



your adversary once you get your timing down. It does take a while to extend your legs over the hurdles, so jump early to avoid tripping.

Moving to the center of the track, we find the field events. At the hammer throw, strength and timing determine how well you'll throw a heavy cast-iron ball attached to a chain. The faster you rotate and the more precisely you time the release of the chain, the further the hammer will fly.

In the pole vault, you'll use a flexible pole to jump over an adjustable bar and land on a foam mat. Electronic fireworks explode on the stadium's Diamond Vision screen to celebrate a successful jump.

Now that you've worked up a sweat, it's time to cool off in the diving competition. Five persnickety judges rate your dives as you springboard to glory and gracefully descend into the water. With a little practice, you'll be nailing inward back pikes and forward twists that would make gold medalist Greg Louganis turn green with envy.

Finally, we move over to the archery range, where arrows travel the length of a football field on their way to the target. You'll learn to judge the wind's speed and direction, with the twang of your bow signaling the launch of each arrow and renewed hopes for success.

The closing ceremonies feature the competitors who have won the most medals, along with the national anthem for the Olympian on the highest platform. The closing graphics are as detailed as the opening scenes, creating again the feeling of actually participating in the XXIVth Olympiad.

Because *The Games—Summer Edition* revives the same excitement I feel every four years with the real Olympics, I rate this game a 9.975. It could just as well be a 10.

—Steve Hedrick

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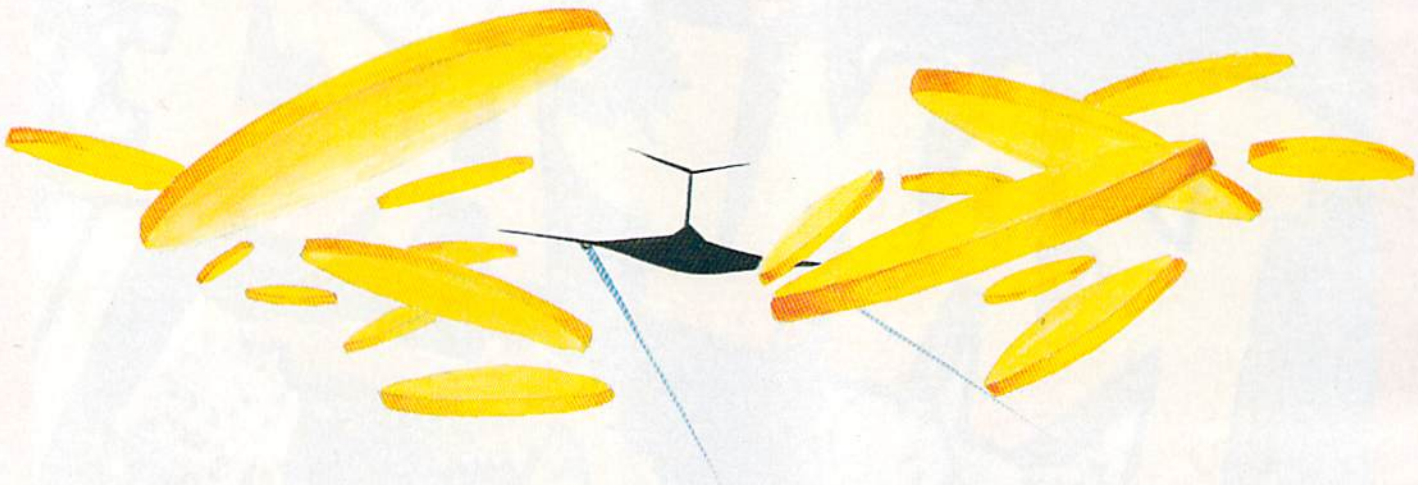


Disc Blitz

Peter Marino

Battle ever-changing formations of aliens in this fast-paced arcade-style game for the 64. A smooth-scrolling background and a space-age musical score set the stage for this addictive game.

Do you believe in flying saucers? If you don't, you will soon. "Disc Blitz" pits you against endless hordes of alien flying saucers.

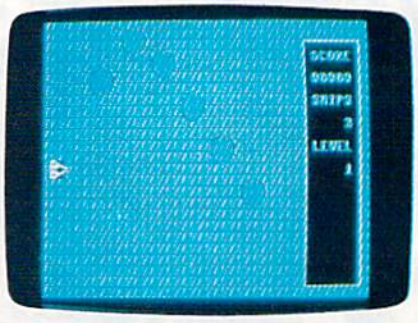
You only have a few short lives. Use them well.

Typing It In

Disc Blitz is written in BASIC, but it includes some machine language code in DATA statements. Type in the program using "The Automatic Proofreader," which can be found elsewhere in this issue. Be sure to save a copy of the program to tape or disk before you attempt to run it.

When you're ready to take on the aliens, load "Disc Blitz" and type RUN. You'll see the Disc Blitz title screen. Press the fire button to begin a game.

In Disc Blitz, you control a fighter that hovers on the left side of the screen. You can move up and down only. To fire, press the fire button. Hold it down for rapid fire. The flying saucers you face fly in several different formations. You're on your own as you learn how to avoid their nasty aggression.



The aliens are relentless. If you're not careful, your next move could be your last move.

When a flying saucer runs into you, you lose a life. You start with four lives, so you must play carefully. There are five levels, but it will take quite a bit of practice to make it that far.

Since the program is written in BASIC, it can be easily modified. You can change the levels, add bonuses, or give yourself a great number of lives.

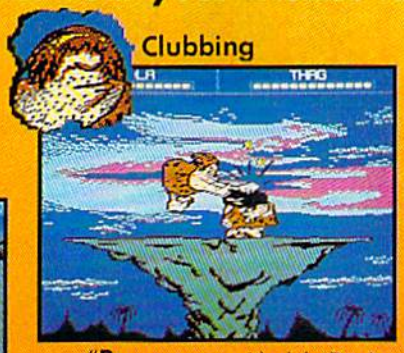
See program listing on page 96.

CAVEMAN UGH-LYMPICS™

By Dynamix, Inc. and Greg Johnson

Before corporate sponsors and fashion gear, there were Cavemen. Competition was *ugh*-ly. Athletes won by bashing the other guy first. Pick your favorite Ugh-lympian. Club your way through six pre-hysterical events. Beat your friends to the Caves Of Fame.

Clubbing



"Become one with club. Don't fall for look-at-birdie-in-sky trick. Don't check feet for fleas."
—Glunk.

Mate Toss

"Swing fast circles. Remember let go. Good for medals. Not good for getting dates."
—Crudla.

Dino Vault

"I like plant pole in totally cave-ular sand, soar high in air, wave to way-hungry dino."
—Thag.

The greatest Neanderthal athletes of all time share their secrets.

Dinosaur Race

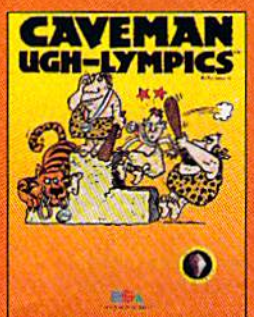
"Club dino head, go faster. Too much club, dino bite dust. Vincent hate dust."
—Vincent.

Sabertooth Tiger Race

"Run fast fast from tiger. Watch out for cactus. Trip other cave-guy. Him big lunch for kitty."
—Gronk.

Firemaking

"Rub sticks fast. Make bright, ouchy, hot thing first. Try not get dizzy. Remember to duck."
—Ugha.



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bombardment

Forrest Bentley

This two-player arcade-action game for the 64 will keep you and a friend on the move. Take advantage of your weapon—the powerful PlasmaBlaster—but don't shoot yourself in the foot. Two joysticks required.

You had hoped it wouldn't come to this. You and a friend started an argument in the Galactic Council. Arguing is strictly forbidden in Council chambers, and rightly so—how else could all the business of the Milky Way get done? You were sentenced to settle your disagreement in the Plasma Pit. Only one of you will emerge. Hopefully, the victor will have learned a lesson: It doesn't pay to argue.

So here you are, you and a friend—now mortal enemies. You face each other across the pit, PlasmaBlaster to PlasmaBlaster. It's sad to think that one of you will die just because you couldn't agree whose turn it was to pay for the coffee.

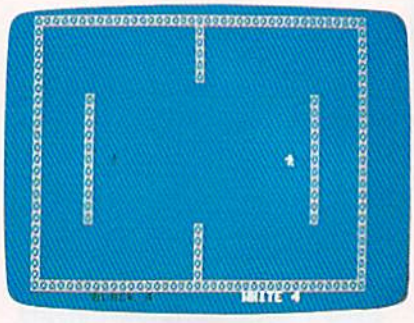
Getting Started

"Bombardment" is written entirely in machine language. Type it in using "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you, respond with the values given below.

Starting address: C000
Ending address: C90F

Type in the data for the program. Before exiting MLX, be sure to save a copy of the data to tape or disk.

To start the game, plug two joysticks into your computer. Now, load the program with a statement in the form LOAD"*filename*",8,1. Tape users should use a statement



Get ready for "Bombardment," a fast two-player action game that keeps you running for your life.

in the form LOAD"*filename*",1,1. Specify the filename you used when you saved the program from MLX. Type NEW and then SYS 49152. You'll see the infamous Plasma Pit.

Dodging Plasma

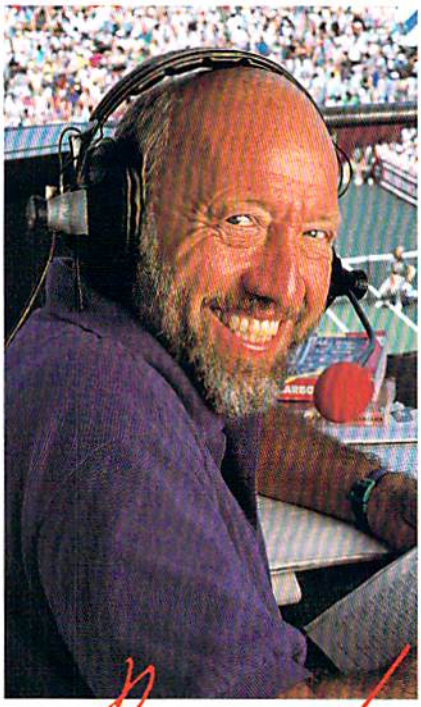
The joystick plugged into port 1 controls the player on the right side of the screen. The other joystick controls the player on the left. Move your player by pressing the joystick in any direction. Fire your PlasmaBlaster by pressing the fire button. Each time you squeeze the trigger, you'll fire a deadly ball of plasma. The pit is magnetically sealed, so the plasma ball ricochets around the room until it strikes something (namely, you or your opponent). The more plasma balls you and your opponent shoot, the more frantic the game becomes.

If you run while you shoot, the plasma ball you fire will move even faster than a normal ball of plasma. Be careful not to run into your own shots; they're just as deadly to you as they are to your opponent.

Both players begin the game with five lives. The winner is, of course, the player who survives. At the end of the game, you'll be asked if you want to play again. Press Y to play another game or N to quit and return to BASIC.

See program listing on page 95.

ANNOUNCING ACCOLADE'S NEW SPORTS GAMES.

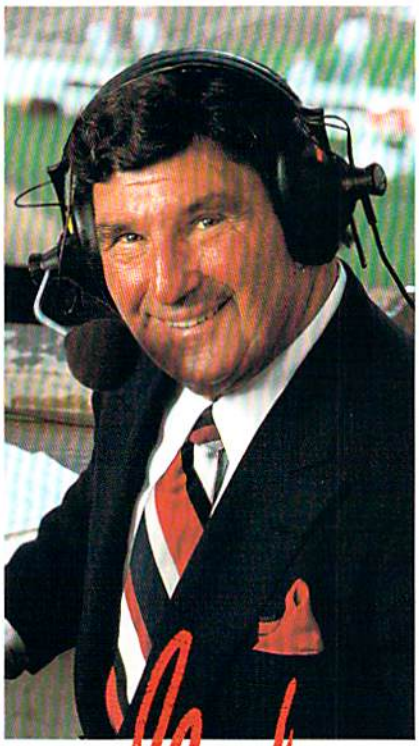


BUD COLLINS
Television tennis analyst

"What do I expect from a computer tennis game? Realism. I want to sense the power of a strong forehand, the ease of a smooth backhand. Accolade's Serve & Volley gives me that realism—and more.

"Serve & Volley truly captures the essence of the game—the action, the strategy, the pressure. You can select and place your shots via the animated "Strobe-O-Stroke" graphics. There's match or tournament play, three levels of difficulty, even three different court surfaces.

"Why should I leave the office to cover a tournament? Now I can play one on my computer with Serve & Volley."



HANK STRAM
Radio voice of NFL Monday Night Football

"I've seen some great moves on the football field but nothing compares to the moves you'll find on 4th & Inches computer football. This is real pro football action with 11 animated players per side. It's great! The ball's snapped and you have 22 guys running around the screen buttin' heads!

"But the best part about 4th & Inches? The control. I pick the starters. I control the key players on offense and defense. Heck, this is a head coach's dream come true! And the playbook? Fantastic. You get a pro style playbook with 20 plays and 11 different formations.

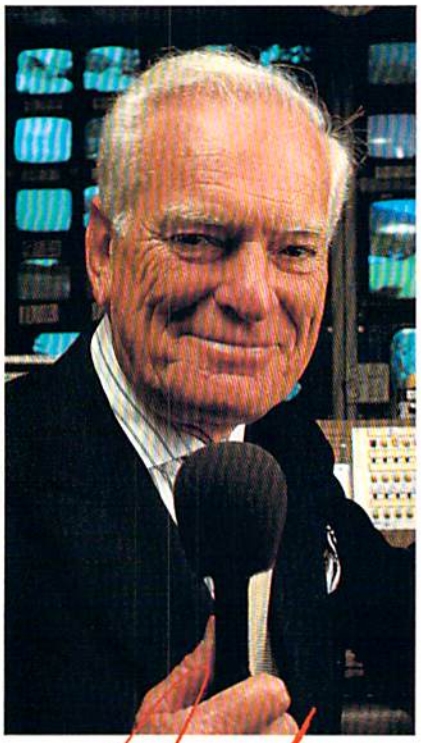
"Somebody at Accolade really knew their X's and O's when they drafted 4th & Inches. Great game plan, guys!"

MARV ALBERT
1988 Olympic boxing commentator

"I used to think my broadcast booth at ringside was the closest I'd ever come to the true boxing experience. Then I played T.K.O. computer boxing. Talk about "up close and personal!" T.K.O. put me right in the ring, face to face with a heavyweight champ.

"During a fight I like to do all the jawing. With T.K.O. I got to jab at a fighter's jaw. I threw a right… it landed! I could actually see those familiar signs of wear and tear on the champ's face. At the bell, the champ had a black eye, a fat lip and—I suspect—a bruised ego.

"It's a unanimous decision. Accolade's T.K.O. captures the feeling of boxing like no other game.



JACK WHITAKER
ABC golf announcer

"Jack Nicklaus is unquestionably the greatest golfer of his time and

I've been fortunate enough to follow his play on the greatest golf courses in the world.

"Jack Nicklaus' Greatest 18 Holes Of Major Championship Golf is the Golden Bear's personal selection of the most challenging holes in all of golf. Holes that have decided the four major championships.

"Accolade has come up with a simulation that not only recreates each hole with stunning accuracy—but it allows the player to golf against a computerized Jack Nicklaus. Quite an accomplishment.

"Jack never settles for second best. This is the computer golf game that others will be judged by for years to come."

CHICK HEARN
Voice of the Los Angeles Lakers

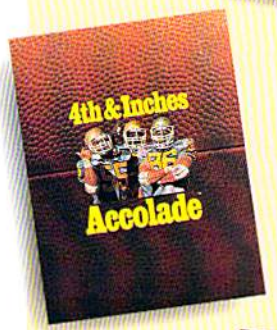
"To play championship basketball, you've got to have a great fast break. To play three-on-three, full court computer basketball you've got to have Accolade's Fast Break.

"No other computer basketball game gives you this much control and playability. You run the offense and defense. There are more plays, more players and more shots. And the thing that really impressed me was the network television court perspective. The animation was so fluid—I thought I was watching my monitor at The Forum!

"Take it from a guy who's

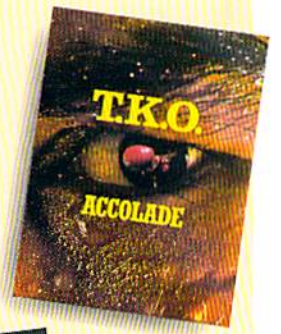
seen his share of great fast breaks—Accolade's Fast Break is a slam dunk."

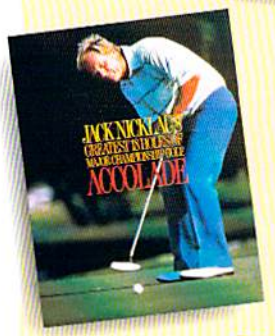
Available on C64/128, IBM PC, Tandy & compatibles and Apple IIGS.



Available on C64/128, IBM PC, Tandy & compatibles, Amiga and Apple IIGS.

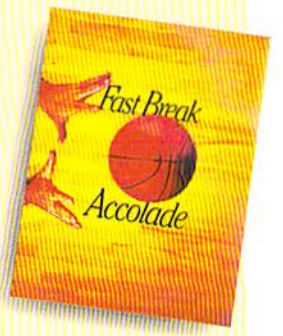
Available on C64/128, IBM PC, Tandy & compatibles.





Available on IBM PC, Tandy & compatibles, C64/128, Amiga and Apple IIGS.

Available on C64/128 and IBM PC, Tandy & compatibles.



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Complete and mail in time for receipt by 3/31/89 to: ACCOLADE PLAY-BY-PLAY SWEEPSTAKES, P.O. Box 914, Wilton, CT 06898-0914.

My choice of Sports Fan Fantasy is an opportunity to... (check ONE please):

☐ Visit with and attend a boxing match broadcast by Marv Albert.
☐ Visit with and attend a Los Angeles Lakers game broadcast by Chick Hearn.
☐ Visit with and attend an NFL Monday Night Football game broadcast by Hank Stram.
☐ Visit with and attend a tennis tournament broadcast by Bud Collins.
☐ Visit with and attend a PGA golf tournament broadcast by Jack Whitaker.

YOUR NAME (please print)

YOUR COMPLETE ADDRESS

CITY/STATE ZIP (required)

NAME OF RETAIL OUTLET YOU SHOP FOR SOFTWARE

CITY & STATE OF THAT STORE LOCATION

Type of Computer Owned: ☐ IBM/Tandy & Compatibles ☐ Commodore 64/128
☐ Apple II Series ☐ Apple IIGS ☐ Other_____

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How to Enter. Provide all the information called for on the official entry form (including your choice of Sports Fan Fantasy prize), or print this same information on a plain 3" x 5" piece of paper and mail your entry in time for receipt by March 31, 1989 to: Accolade Play-By-Play Sweepstakes, P.O. Box 914, Wilton, CT 06898-0914. Enter as often as you wish, but each entry must be sent in a separate envelope via First Class Mail.

Prize Awards. The five (5) different Sports Fan Fantasies listed on the entry form comprise this program's prize offering, each fantasy to include such transportation arrangements and other accommodations as may be necessary for two persons traveling together, including the sports event tickets. All arrangements shall be made by Accolade at its discretion as to announcer visit time and place and event selection. Applicable period for fan fantasy arrangements shall be 4/15-12/31/89. Each winner will be offered the option of receiving $1,500 cash instead of the fan fantasy prize for two.

Winner Drawings. One winner will be chosen for each of the five different Sports Fan Fantasy prizes by means of a series of random drawings to be conducted on 4/1/89 by AMA, Ltd., an independent judging organization whose decisions are final. Prize winners will be notified by mail by 4/8/89. Odds of winning the Sports Fantasy indicated as an individual entrant's choice depend on the number of entries received indicating that same event choice. Winners will be required to provide social security number and to sign an affidavit of eligibility and publicity/travel release. Tax liability on prize winnings is responsibility of each winner. Prizes are not transferable, although any prize won by a minor will be awarded in the name of a parent or legal guardian.

Eligibility. Sweepstakes open to all U.S. residents except employees of Accolade, Inc., its marketing agencies, this program's suppliers, and their immediate families. Void wherever prohibited or restricted by law. To request a list of the prize winners, send a stamped, self-addressed envelope before 4/1/89 to: Accolade Play-By-Play Winners, P.O. Box 7180, Wilton, CT 06897-7180.

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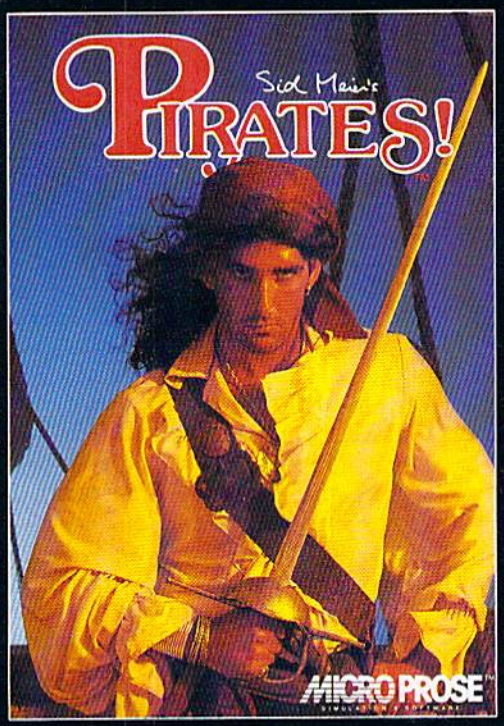
Pirates Continue To Win Awards!



★ **Best Screen Graphics**
1988 Origins Awards
presented by the Academy of Adventure Gaming Arts and Design

★ **Best Fantasy or Science Fiction Game**
1988 Origins Awards
presented by the Academy of Adventure Gaming Arts and Design

★ **1988 Action Game Of The Year**
Computer Gaming World

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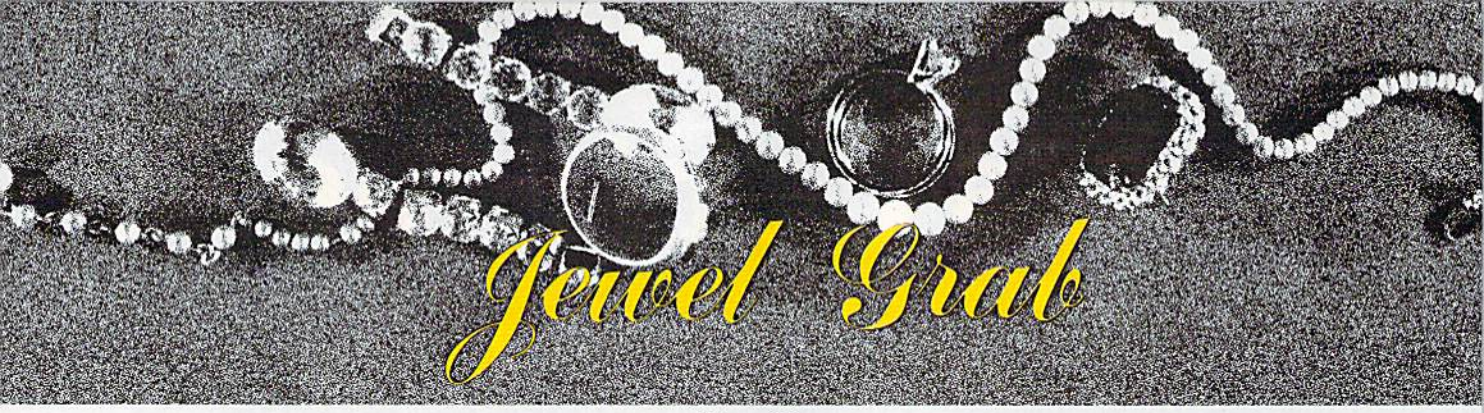


Brian Casey

Outwit roomfuls of smart robots to nab precious gems in this challenging arcade-style game for the Commodore 64. Joystick required.

No one knows who built the mine that was recently discovered on the far side of the moon. But frankly, you're not interested in the archaeological significance of the find. You've been hired by the MegaBux Corporation to do what two previous expeditions have failed to do—bring back the loot.

To do that, you'll need to avoid the dangerous sentries that the few survivors of the second expedition speak of. Those sentries will chase you down if you take too long to get the jewels, most of which are placed inconveniently in the mine.

When you decide to play "Jewel Grab," bring a joystick and your wits.

Getting Started

Jewel Grab is written in machine language, but it loads and runs like a BASIC program. Type it in with "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you, respond with the values given below.

Starting address: 0801
Ending address: 17B8

Carefully enter the data for the program. Before exiting MLX, be sure to save a copy of the program to tape or disk.

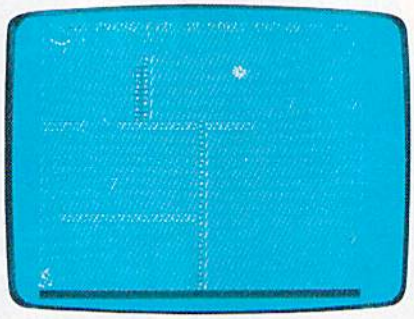
To play a game of Jewel Grab, plug a joystick into port 2. Load the program and type RUN. The game asks you to select a speed in the range 1–4. For your first game, try 1. Start the game by pressing the fire button. You begin Jewel Grab with five lives.

The mine has four levels. Each level consists of six rooms. Suspended in each room are several jewels. Collect them all to progress to the next level.

Robot Guards

Each room has at least one sentry. The sentries operate by first scanning for your position and then moving to that position. Some sentries scan often and home in accurately but move very slowly. Other sentries move quickly but scan infrequently. You'll have to adjust your strategy depending on the types of sentries that you face.

If you're zapped by a sentry, the room you're currently in is restored to its original condition (the jewels are replaced).



Make money the hard way—collect jewels from an archaeological dig on the far side of the moon.

You have several resources with which to gather the jewels and avoid the sentries. Use the joystick to move along the girders and ladders that are strewn throughout the mine. Jump by pressing the fire button while pushing the joystick left, right, or up. You needn't worry about running off the ends of the girders—because of the moon's weaker gravity, you can survive a fall from even the highest of girder.

Sometimes, you just won't be able to get to a jewel. In these cases, you can carry up to four girder sections and four ladder sections to build a path to the stubborn jewels. To pick up or drop a girder piece, pull the joystick down and press the fire button. To pick up or put down a section of ladder, simply press the fire button alone. The number of girders and the number of ladder sections that you are carrying are both displayed at the top of the screen.

Freeze, Buddy

Each room is equipped with a clock. If you grab the clock, the sentries will be confused; they'll freeze for a few moments. Keep an eye on the red bar at the top of the screen—it shows the amount of time that the sentries will be frozen. The sentries are still deadly while they're frozen, so don't walk into them.

If you manage to capture all the jewels, you'll be awarded a bonus life (you can have up to ten lives). There are 24 screens in all. You win if you make it through all of them.

It pays to be patient when you play Jewel Grab. Try moving to a bare part of the screen for a while; the sentries will begin to gather around you, and you can dart away to grab the jewels on another part of the screen.

The sentries memorize your position every time they execute a scan, so you can get a head start if you begin running as soon as you hear the telltale sound that indicates scanning. Each sentry on a screen scans at a different time, so it may take some fancy footwork to get around them all.

Press the SHIFT LOCK key to pause the game. You can quit Jewel Grab by pressing Q. (By the way, Jewel Grab features a special cheat key: Press R to advance to the next room.)

See program listing on page 92.

European Rush Hour.

Accolade's Grand Prix Circuit is the Formula One racing simulation that whisks you to an exclusive world of power, passion

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You'll race for the world-renowned teams of McLaren, Ferrari, and Williams on the greatest Grand Prix courses.

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USER GROUP Update

Mickey McLean

The following list includes updated entries to our annual "Guide to Commodore User Groups," which last appeared in the May and June 1988 issues.

Send typed additions, corrections, and deletions for this list to

COMPUTE! Publications
P.O. Box 5406
Greensboro, NC 27403
Attn: Commodore User Groups

When writing to a user group for information, please remember to enclose a self-addressed envelope with postage that is appropriate for the country to which you're writing.

User Group Notes

The **Commodore Technical User Group (CTUG)** has changed its address to P.O. Box 1497, Costa Mesa, California 92628.

The correct address for the **Suncoast Commodore Club** is P.O. Box 6628, Ozona, Florida 34660-6628.

The **NorthEastern Computer Rappers of Illinois 64-128 of America (NECRIA)** from Lockport, Illinois, has disbanded.

The **Knox Commodore Club** has a new address and a 24-hour bulletin board service. All club correspondence should be sent to P.O. Box 494, Galesburg, Illinois 61402-0494. The club's BBS number is (309) 343-1556.

The Rainbow International C-64 Users' Group has a new address: 55 Expressway Village, Niagara Falls, New York 14304.

The **Sanlee Commodore Club** has changed its address to 514 Colonial Drive, Sanford, North Carolina 27330.

New Listings

CALIFORNIA

East County Commodore Users Group, P.O. Box 21399, El Cajon, CA 92021

Fresno Commodore User Group/64UM, P.O. Box 16098, Fresno, CA 93755

Hub Area Commodore Club (HACC), 18391 Sisil Ln., Penn Valley, CA 95946

GEORGIA

Commodore Users Group of Atlanta, P.O. Box 2031, Tucker, GA 30085-2031

INDIANA

Bloomington Commodore Users Group (BCUG), 403 E. Audubon Dr., Bloomington, IN 47401

MICHIGAN

Computer Operators (COMP), 2937 E. Woodland Dr., Port Huron, MI 48060 (BBS# 313-364-6489)

Saginaw Area Commodore User's Group (SA-CUG), P.O. Box 2393, Saginaw, MI 48605

Bay Area Commodore Club, 338 S. Sheridan Ct., Bay City, MI 48708

NEW YORK

Computer Club, P.O. Box 4339, Elmira, NY 14904

NORTH CAROLINA

Baileys User Group (BUG), P.O. Box 70, Holly Springs, NC 27540

OREGON

United Commodore Users Group, 5665 Trout Creek Rd., Mt. Hood/ Parkdale, OR 97041

Crash-64 Salem Area's Commodore User's Group, P.O. Box 241, Salem, OR 97308 (BBS# 503-585-3092)

Albany Corvallis Commodore Users Group (AC-CUG), P.O. Box 1124, Corvallis, OR 97339

PENNSYLVANIA

Scranton Commodore Users Group, P.O. Box 211, Clarks Summit, PA 18411

RHODE ISLAND

Narragansett Commodore Users Group, P.O. Box 8707, Cranston, RI 02920

SOUTH CAROLINA

Commodore Ham User's Group (CHUG), P.O. Box 221, Goose Creek, SC 29445-0221

VIRGINIA

Commodore Users of Lynchburg (C.U.O.L.), P.O. Box 3386, Riverfront Station, Lynchburg, VA 24503 (BBS# 804-845-3135)

WEST VIRGINIA

Commodore Order of Renegade Programmers (The CORP), 911 Belvedere Dr., Charles Town, WV 25414

WISCONSIN

Madison Area Commodore Users Group (MA-CUG), P.O. Box 1305, Madison, WI 53701-1305

Outside the U.S.

APO

The Muenster Garrison User's Group, c/o Randall Harper, 583rd Ord. Co., APO, NY 09078

International Commodores Owners Network (ICON), c/o Glenn Whitehead, E. Co. 708th S.B., APO, NY 09185

Chicksands Computer Club (C cubed), Attention: Computer Club Recreation Center/SSRR, RAF Chicksands, APO, NY 09193

AUSTRALIA

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Stawell Commodore User Group, P.O. Box 299, Stawell, 3380, Australia

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Kelowna Computer User Group, #11-4131 Lakeshore Rd., Kelowna, British Columbia, Canada V1W 1V8

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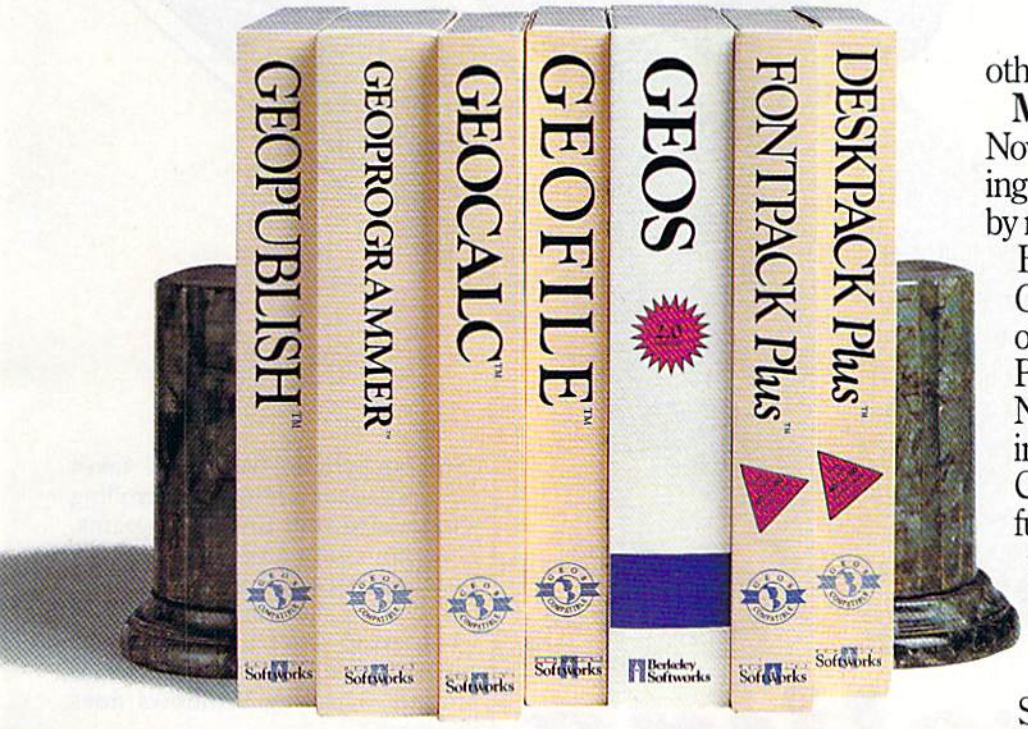

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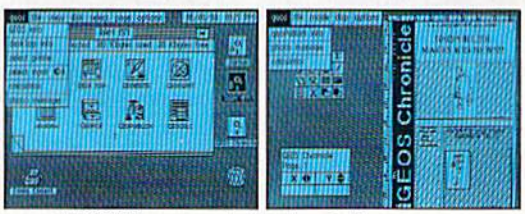

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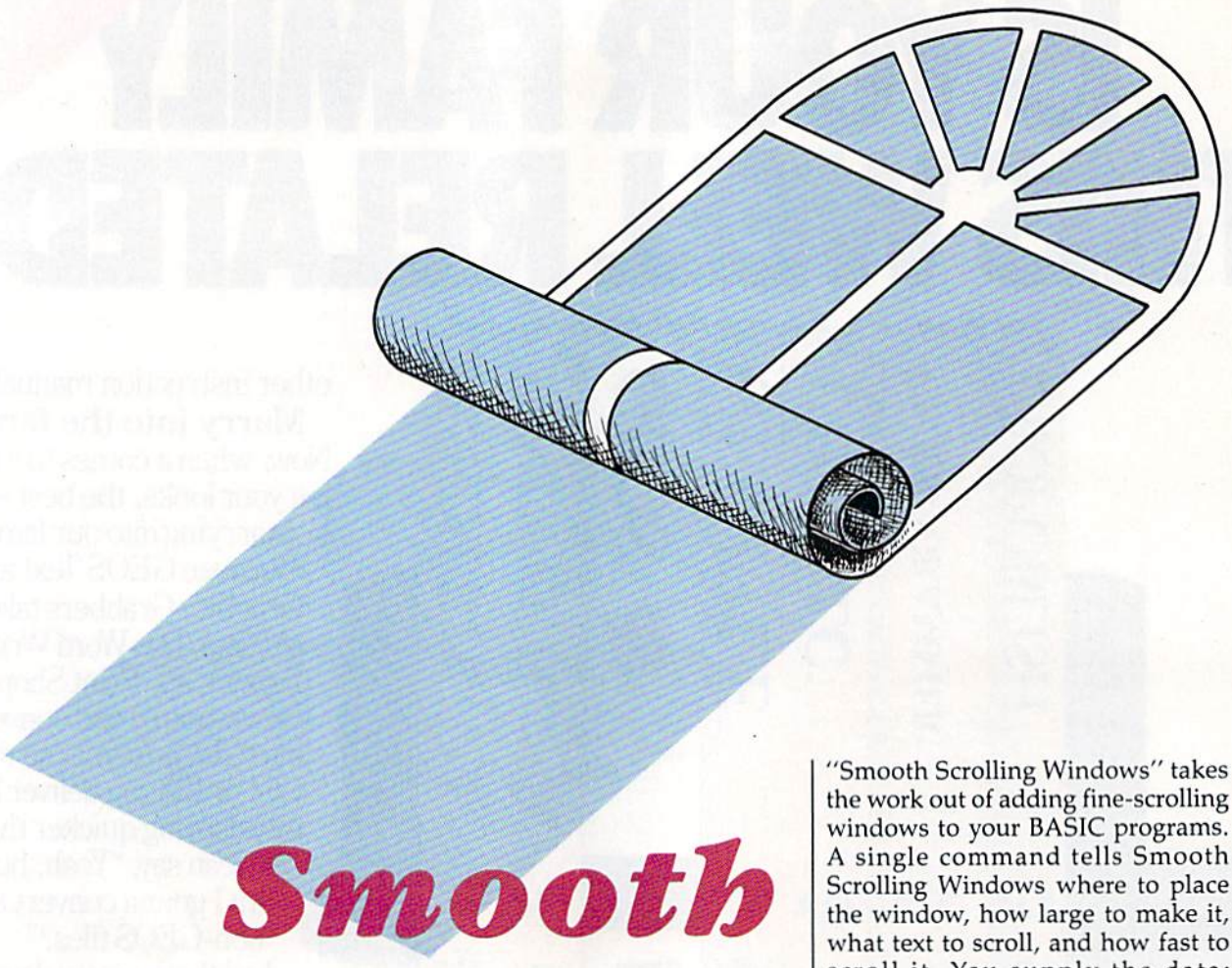

Smooth Scrolling Windows

Peter M. L. Lottrup and Pablo Garibaldi

Here's a great new special effect for BASIC programmers—pop-up windows with smooth-scrolling text. For the Commodore 64.

"Smooth Scrolling Windows" takes the work out of adding fine-scrolling windows to your BASIC programs. A single command tells Smooth Scrolling Windows where to place the window, how large to make it, what text to scroll, and how fast to scroll it. You supply the data; Smooth Scrolling Windows does the work.

Typing It In

Program 1, ML-SCROLL, is written in machine language, so you must use "MLX," the machine language entry program found elsewhere in this issue, to enter it. When MLX prompts you, respond with the values given below.

Starting address: **$CC00**
Ending address: **$CF9F**

Be sure to save a copy of the program with the filename ML-SCROLL before leaving MLX.

Program 2, SCROLL.DEMO, is an example of how to use Smooth Scrolling Windows from within a BASIC program. To prevent typing errors, be sure to use "The Automatic Proofreader" when you enter Program 2.

Scroll Your Own

Using Smooth Scrolling Windows is a two-step process. You must first call the subroutine to set up the

window to be scrolled and then call the routine that actually scrolls it. Both subroutines are called using the SYS command. The call for the setup subroutine must be followed by a series of parameters to define the window and text to scroll. The format is as follows:

SYS 52224,*row,col,vlen,hlen,speed,text*

Row and *col* are the coordinates of the top left corner of the window. They may contain values in the ranges 0–24 and 0–39, respectively. *Vlen* is the vertical length or height of the window. *Hlen* is the horizontal length or width of the window. *Speed* is a value that specifies how fast the text should be scrolled, and *text* defines the text to be scrolled.

There are several restrictions you must keep in mind. *Vlen* must be a value in the range 1–25. *Hlen* must be in the range 1–40. If you enter a value outside of these ranges, you'll get an ILLEGAL QUANTITY ERROR. A window may contain no more than 128 characters. If *vlen* * *hlen* is greater than 128, you'll get an ILLEGAL QUANTITY ERROR. Finally, the whole window must fit on the screen. If *row* + *vlen* is greater than 25 or if *col* + *hlen* is greater than 40, Smooth Scrolling Windows prints ILLEGAL QUANTITY ERROR.

There are 256 possible speeds for scrolling the text. A value of 0 selects the fastest scroll rate; a value of 255, the slowest. The actual scrolling speed varies according to the size of the window to be scrolled. (Large windows scroll more slowly than small ones.)

The *text* parameter must be a string-array element. *Text* defines the first element of the string array to be scrolled. For example, if you want to scroll the text in an array TX$( ) starting with the fifth element, call the setup routine with

SYS 52224,7,12,9,14,0,TX$(5)

Place a left-arrow character in a string by itself to mark the end of the text to be scrolled. For example, if TX$(8) is the last string you want printed, TX$(9) should be "←".

Smooth Scrolling Windows uses the value stored in address 702 to determine how many lines of text to scroll. If it's a value other than 0, that many lines of text will scroll before returning to BASIC. If the value in 702 is greater than the number of lines of text defined for the window, Smooth Scrolling Windows repeats the text. A value of 0 in 702 causes the text to scroll until a key is pressed.

Two commands turn scrolling on and off. The first, SYS 52227, starts scrolling the windows. The second, SYS 52230, stops the scrolling. By having separate calls for defining and activating the Smooth Scrolling windows, you may place several windows on the screen and then activate them at the same time. The drawback to this method is that all windows scroll the same text at the same speed. You can take advantage of this to achieve a scrolling backdrop effect, as shown in the demo program.

This program offers new effects, like this full-screen scrolling window.

Special Characters

If a string is longer than the current window, it's truncated to fit in the window and the remaining characters are ignored. A string that's shorter than the window width is padded with trailing spaces. If you need to place blank lines in the text, simply enter null strings (" "). Smooth Scrolling Windows will print a line of spaces.

Smooth Scrolling Windows doesn't display reversed characters, cursor-control characters, color characters, and other control characters correctly. Be sure not to include any of these characters in your text.

How It Works

The VIC-II chip has two smooth-scrolling registers, one each for the horizontal and vertical directions. The registers make it easy to scroll the screen pixel by pixel, but they control the whole screen. If you want to scroll only a portion of the screen, you must either write your own routine to do so or blank the rest of the screen and use the VIC-II's registers to scroll the whole screen.

Smooth Scrolling Windows does not operate on the whole screen. In fact, you define the size of the window in which to scroll the text. Although this window is limited to a maximum of 128 characters, you decide the length and width of the window. The program does not require a hi-res screen or any sprites to operate—the text is scrolled directly on the text screen.

Smooth Scrolling Windows scrolls the text using custom characters. The smooth scrolling routine simply uses the reverse character set to create the window. The smooth scrolling effect is created by redefining these characters on the fly.

To use custom characters, Smooth Scrolling Windows reconfigures the VIC-II to use bank 3 video RAM. Before it starts scrolling the text, Smooth Scrolling Windows copies the text screen to a new text screen at $C800 in bank 3. If your program accesses the screen directly (with POKEs or PEEKs) while the Smooth Scrolling routine is active, it should access the alternate screen at $C800–$CBFF. When you deactivate the routine using SYS 52230, the computer is returned to its standard configuration.

Smooth Scrolling Windows deactivates switching between uppercase/graphics and lowercase/uppercase using the SHIFT/Commodore-key combination. To switch character sets, use one of the following commands before you start scrolling:

POKE 52293,208 for uppercase/graphics
POKE 52293,216 for lowercase/uppercase

Also, be careful with RUN-STOP/RESTORE. Pressing RUN-STOP/RESTORE while a window is scrolling restores the text screen to bank 0 but leaves the alternate screen active. To return the text screen to normal, type **POKE 648,4**. (You'll have to type this command blindly.)

Finally, you may want to allow only specific keypresses to exit the smooth-scrolling routine. Whenever a key is detected, Smooth Scrolling Windows exits to BASIC and stores the keypress in address 2.

See program listings on page 97.

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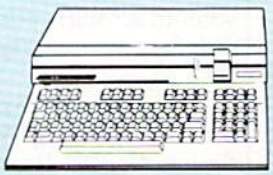

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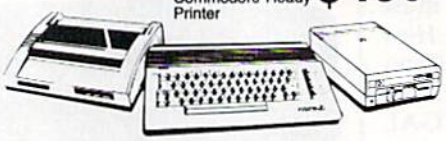

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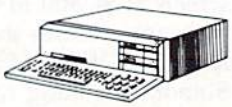

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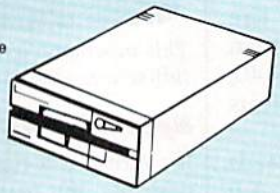

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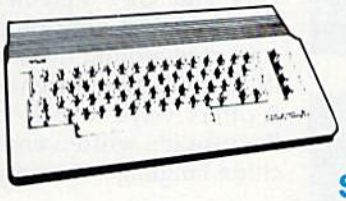

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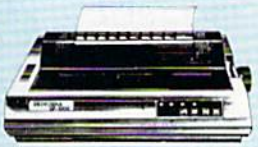

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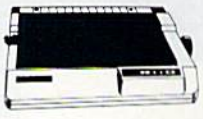

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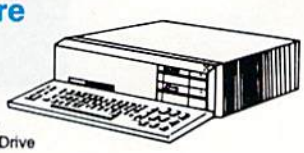

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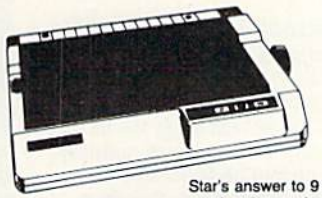

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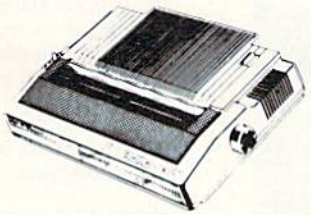

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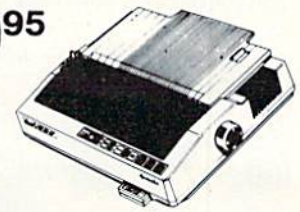

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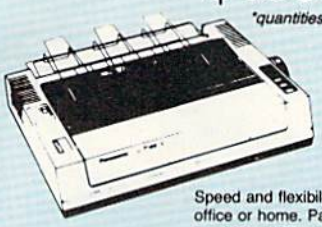

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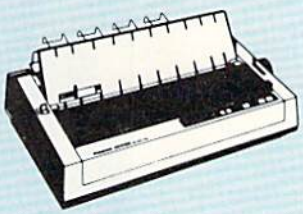

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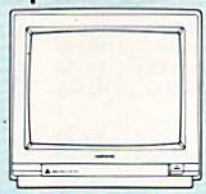

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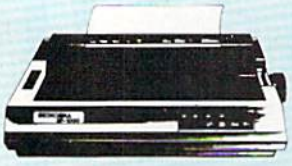

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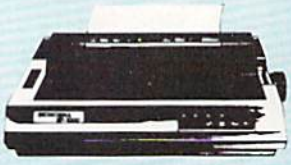

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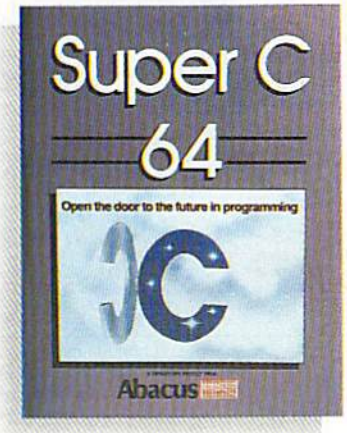

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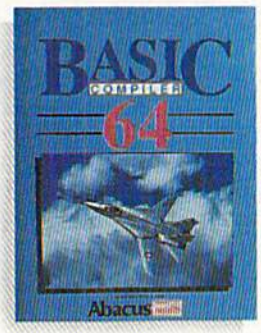

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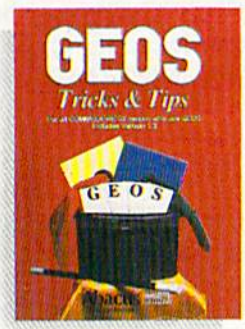

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3 TECHNICAL PROGRAMS

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Subject to: $3X_1 + X_2 < 44$; $X_2 < 10$; $X_1 + X_2 < 18$; $2X_1 + 5X_2 < 60$

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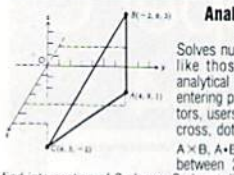
Solves linear programming problems of up to 50 variables and 35 constraints. Systems may be restricted by constraints of *equality, less than or greater than*, (different types may appear in the same problem). Objective (Z function) may be maximized or minimized. Computer displays solution (in example at left, Z=31, X_1=13, X_2=5). Initial and final tableaus. Special command for easy entry of sparse constraints.



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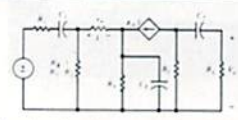

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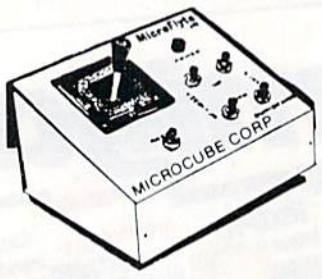

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types. If *A$* contains a string prior to the call, Deluxe Input displays the string in the input field. This is useful if you wish to provide a default selection. If you don't want a default to appear, set *A$* to a null string (*A$*="") before the call.

B$* is a string variable (again, you may substitute any legal variable name) that returns the character the user has pressed to end input. Normally, *B$ contains the default exit character, which is CHR$(13) (13 is the ASCII code for the RETURN key). However, you can specify other exit characters. See "Setting Exit Characters" for instructions.

The remaining parameters are numeric. They may be entered as numbers or variables which contain the desired values.

Limit sets the maximum number of characters that users may enter. *Limit* may range from 0 to 78. When *Limit* is 0, Deluxe Input allows you to enter only exit characters. This is useful for building menus. Here's an example menu:

```
Choose an animal:

D   Dog
C   Cat
F   Fish

Press RETURN if you don't own one.
```

In your program, specify a limit of 0, and specify that the letters *D*, *C*, and *F* are exit characters (see below). Call the Deluxe Input routine; then check B$ to see which exit character was pressed.

RVS stands for *reverse*. Set RVS to 0 for a normal entry field. Set it to 1 for a reverse field. *CurSpeed* allows you to set how fast the cursor blinks. Use a value of 20 for a normal speed. With *Bell* set to 1, a bell sounds when the user has filled the field. Set *Bell* to 0 to silence the bell sound. Set the color of the box around the input field with the *InBox* parameter. Use 0 for a black box, 1 for a white box, and so on. If you'd rather do without the box, set this parameter to 255.

Type controls the kinds of characters the user can input. *Type* can range from 0 to 4, which limits input to the following classes of characters:

0	any character
1	numbers only
2	alphabet only
3	numbers and alphabet only
4	lower- to uppercase conversion

If *Type* is 1, the user can enter only the digits 0–9 plus the negative sign (−) and the decimal point (.). This permits entry of negative and decimal numbers. If you need a numeric value, use BASIC's VAL( ) function to convert A$ into a number. Set *Type* to 4 to convert letters from lowercase to uppercase in upper-/lowercase mode. An easy way to lock in this mode is to PRINT CHR$(14) to set upper-/lowercase mode, then PRINT CHR$(8) to disable the SHIFT-Commodore keys.

Users can correct typing errors with DEL and the left- and right-cursor keys. The cursor always remains within the input field.

If you call the Deluxe Input routine more than once, you may omit values on repeated calls. Values omitted in subsequent calls remain the same as they were in the previous call. For example, to call Deluxe Input without modifying any value but the field length, use the command

```
SYS49152,A$,B$,50
```

All values not set in the current command retain their previous values.

Setting Exit Characters

Normally, input ends when the user presses RETURN. However, you can substitute another character or even a list of characters that will end input. First, POKE 49919 with the number of exit characters (a maximum of 11) that you wish to use. Then POKE the ASCII values of your exit characters into memory beginning at location 49920.

The Demo

"Deluxe Demo" (Program 2) is a BASIC demonstration program that shows how every Deluxe Input option is used. Line 20 shows you how to load the machine language DINPUT file automatically.

Beginning on line 530 is an example of how to modify the set of characters which exit the input routine. Simply include the set of exit characters in *B$* and GOSUB to this routine. On line 550 you'll find a convenient cursor-location subroutine. To use it, set the value of X to the row number and the value of Y to the column number; then GOSUB to the routine.

See program listings on page 98.

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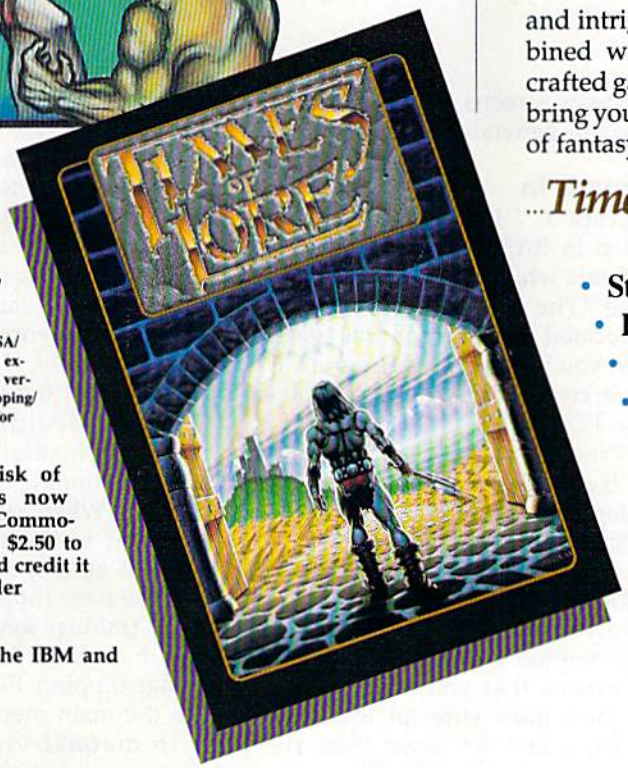

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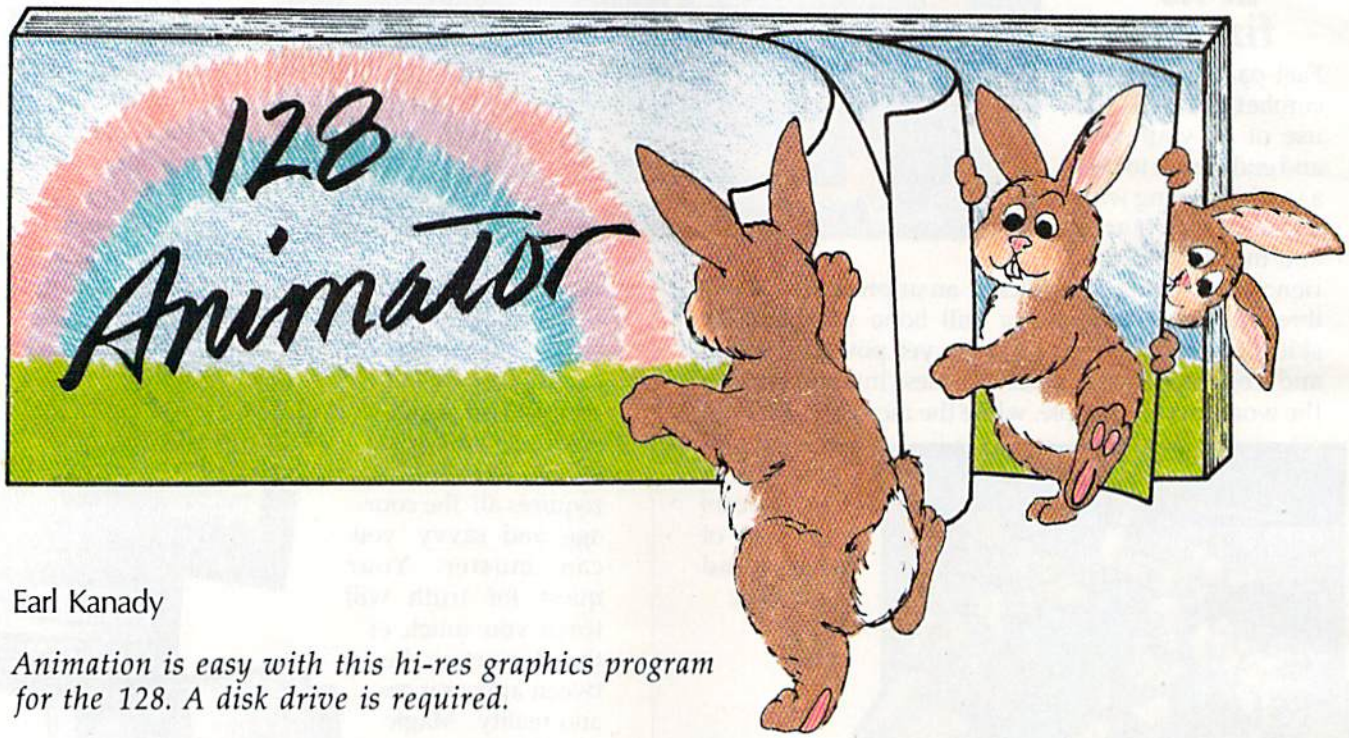

Earl Kanady

Animation is easy with this hi-res graphics program for the 128. A disk drive is required.

Page flipping is a technique that has been used to bring cartoon characters to life for decades. You can try it out with a pencil and a pad of paper. Simply draw stick figures on separate sheets of paper, changing each figure slightly from the previous one. Then hold the sheets by one edge and flip through the pages. Instant animation!

"128 Animator" is a page-flipping program for the 128 that allows you to load as many as six high-resolution screens at one time. Once they're in memory, 128 Animator can flip through the screens, creating the illusion of movement. It can also display the screens individually so that you can examine each frame.

You can design screens using your favorite graphics program and put them into motion using 128 Animator. It can display hi-res screens drawn with most graphics programs for either the 64 or the 128. You can also create screens with the included screen-generator program.

Typing It In

Program 1, "128 Animator," is written in BASIC. To prevent typing errors while entering it, be sure to use "The Automatic Proofreader," located elsewhere in this issue. When you have entered Program 1, save a copy to disk with the filename 128ANIM.

Program 2, "Screen Generator," is also written in BASIC. Enter it using the Automatic Proofreader and save a copy to disk.

Getting Started

When you run 128 Animator, you are prompted for the filenames of the screens that you want to display. You must enter at least two filenames and no more than six. After you've entered the filenames, 128 Animator asks you to verify that the filenames have been entered correctly. Be sure that the files that you enter are on the disk in drive 8. If 128 Animator is unable to find a file, it stops with the message FILE NOT FOUND ERROR.

Once the files are loaded, 128 Animator displays the main menu. You can choose among options to view your sequence automatically, view it manually, choose a new set of files, or exit the program.

If you decide to view the screens automatically, 128 Animator begins flipping through them in sequence. When you first run the program, it flips through the screens as quickly as possible. Slow down the page flipping by pressing the − (minus) key or SHIFT-−. Press + or SHIFT-+ to speed up the page flipping. Press RETURN to go to the main menu.

In manual-view mode, 128 Animator prompts you for the number of the screen that you want to view. Press the number key cor-

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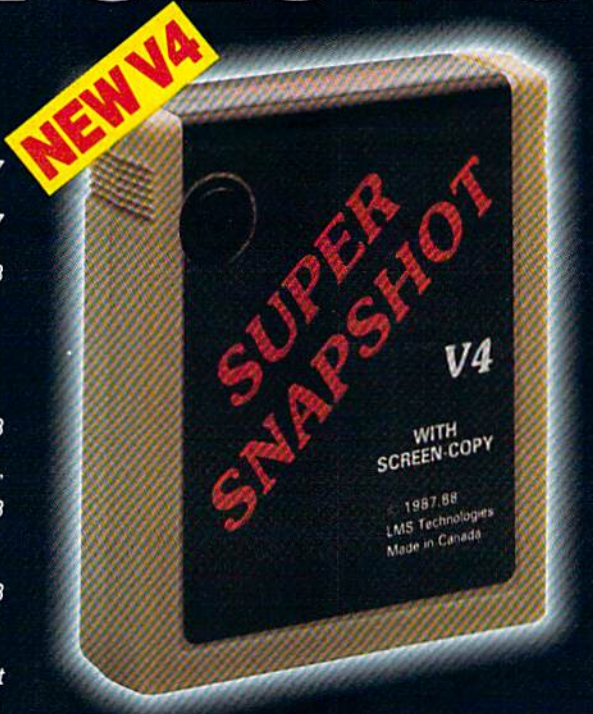

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responding to the number of the screen you wish to see. You can view a different screen by pressing the corresponding number key. Press RETURN to return to the main menu.

Creating Sequences

128 Animator can display any high-resolution graphics file that is created on the 64 or 128. The only restriction that 128 Animator imposes is that the color data and bitmap data be saved together. *Doodle* is an example of a program that saves the color and bitmap data together. (If the picture file occupies 36 or 37 blocks on disk, then the color and picture have been saved together.)

If the bitmap and color data have been saved as separate files, you may be able to combine them by loading each separately and then saving them as a single file. This can be done with the following sequence of commands:

```
BLOAD "color filename",P7168
BLOAD "bitmap filename",P8192
BSAVE "new filename",P7168 TO P16384
```

FlexiDraw screens, with color, are saved in this format.

To load single-color hi-res screens such as those produced by *ComputerEyes* or *FlexiDraw* without color, you must set color 0 and color 1, load the bitmap, and then resave the color and bitmap as one file:

```
COLOR 0,1:COLOR1,2
BLOAD "bitmap filename",P8192
BSAVE "new filename",P7168 TO P16384
```

Quick Draw

You can use Program 2, Screen Generator, to draw simple animated sequences. It generates six graphics screens and saves them to disk with the filenames PIC1–PIC6. Before you run Program 2, be sure that the disk in drive 8 has at least 222 blocks free.

By making minor changes to Program 2, you can create different animated sequences. Try making these changes:

```
60 C$=RIGHT$(STR$(C),1):BSAVE"PICA
   "+C$,P7168 TO P16384
70 L=L-101:H=H-60:C=C+1:IFC<=
   6THEN40
```

Or try these:

```
30 X=159:Y=99:L=86:H=50:S=0:E=
   360:N=0:I=60:C=1
60 C$=RIGHT$(STR$(C),1):BSAVE
   "PICB"+C$,P7168 TO P16384
70 L=L-101:H=H-70:C=C+1:IFC<=
   6THEN40
```

How It Works

The VIC-II chip has the ability to address four video banks in both of the 128's RAM banks. This means that there are a total of eight video banks available. However, because the MMU registers occupy memory above 65280 in both RAM banks, using video bank 3 is not very practical. This leaves six video banks that are easily accessible.

These six available video banks can be used by POKEing two memory locations, 54534 and 56576. Location 54534, the RAM-configuration register, switches the 128 between RAM 0 and RAM 1. Location 56576, the port A I/O data register, switches among the four video banks in each RAM bank. By POKEing specific values into these two locations, you can switch to any of the six screen areas very quickly.

128 Animator loads six hi-res graphics screens, one into each of the accessible video banks. After the files are loaded, displaying any of the screens is simply a matter of POKEing the right values into the two registers.

See program listings on page 103.

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Smart Disassembler

Louis Giglio

Unravel the secrets of the pros. "Smart Disassembler" produces meaningful source code from cryptic numbers. For the 64.

If you've ever disassembled a machine language program, you've probably seen statements such as JSR $C738. Wouldn't it be better to see JSR DISPLAY instead?

"Smart Disassembler" is a RAM-based disassembler that replaces all addresses in JMP and JSR commands with meaningful labels whenever possible. The program can send disassembly to the screen or printer, and it can also disassemble machine language programs located under the BASIC or Kernal ROM.

Getting Started

Smart Disassembler is written entirely in BASIC. Using "The Automatic Proofreader" program found elsewhere in this issue, carefully type in Smart Disassembler and save it to tape or disk before attempting to run it.

To use Smart Disassembler, first load the machine language (ML) program you'd like to disassemble; then load and run Smart Disassembler. Enter the ML program's starting address in decimal. Next, enter an address where you would like the disassembly to stop. If you don't want Smart Disassembler to stop automatically, just press RETURN.

Next, the main menu appears. Use the function keys to make a selection. Press f1 to begin the disassembly or f8 to exit Smart Disassembler. Press f3 to toggle the use of subroutine labels on and off, f5 to switch between decimal and hexadecimal output, and f7 to enable or disable output to the printer. The f6 key toggles the ability to disassemble the RAM under ROM. Set this option to YES if the program you wish to disassemble resides in RAM under the BASIC or Kernal ROM. If you set this option to NO, you can disassemble your 64's operating system and even BASIC itself.

The disassembly may be paused by pressing any key. To resume disassembly, press the space bar. Pressing f1 instead displays the main menu, allowing you to change any of the initial settings. Press f1 to resume the disassembly.

Memory Conflicts

It's possible that the code you want to disassemble resides in BASIC's memory (2048–40959) or in memory locations 820–840. If this is the case, Smart Disassembler will overwrite and destroy the ML program. There are several ways to prevent this from happening.

If the program resides high in BASIC's memory, you can lower the top of BASIC by typing

```
H=INT(AD/256):POKE 56,H:POKE
55,(AD-256*H):CLR
```

where AD is the address of the new top of BASIC (make sure AD is less than the starting address of the ML program). Enter this command in direct mode before you load and run Smart Disassembler.

Similarly, if the program resides low in BASIC's memory, you can raise the bottom of BASIC by typing

```
H=INT(AD/256):POKE 44,H:POKE
43,(AD-256*H):POKE AD-1,0:NEW
```

where AD is the address of the new bottom of BASIC (make sure AD is greater than the ending address of the ML program). Enter this command in direct mode before you load and run Smart Disassembler.

Smart Disassembler stores a small ML subroutine at 820–840. If your ML program resides in this area, Smart Disassembler's subroutine must be relocated. Change the value of the variable ML in line 30 to any location with at least 20 bytes of unused RAM.

Customizing the Program

You may include your own address labels by adding DATA statements to Smart Disassembler and changing the value of the variable NL in line 20. Note that the 39 Kernal ROM routine labels have already been entered, so there is no need to add them.

For example, if you know a subroutine at location 50000 is a string input routine, you might want to label it as INSTRING. Enter the label and address (in decimal) as a data statement at the end of Smart Disassembler. For this example, you type

```
2000 DATA INSTRING,50000
```

Add the number of additional address labels to the variable NL. In this case, one address label has been added, so line 20 should be reentered as

```
20 NL=40
```

(NL was 39 before INSTRING was added.) Thereafter, all JSR 50000 or JMP 50000 statements will be replaced by JSR INSTRING and JMP INSTRING, respectively.

See program listing on page 102.

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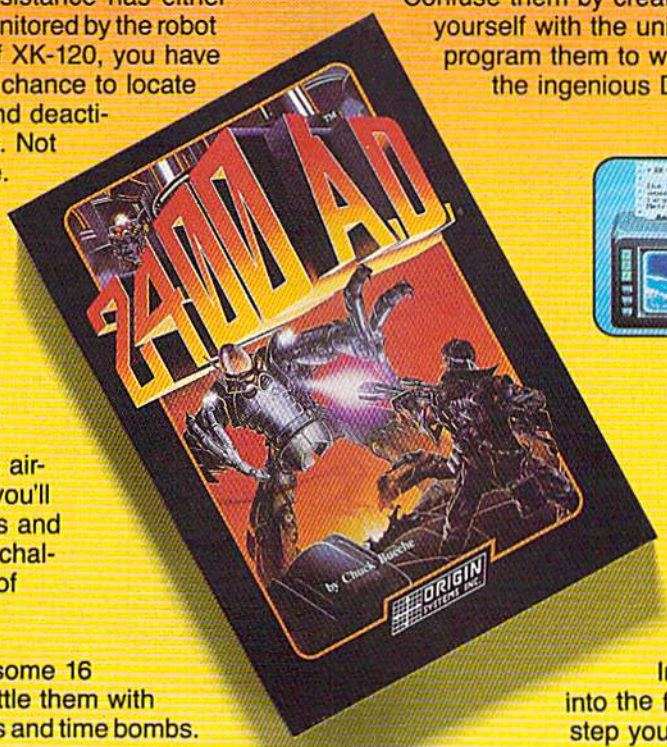

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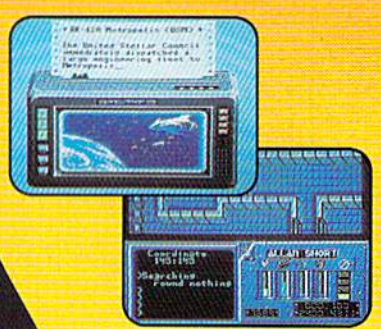

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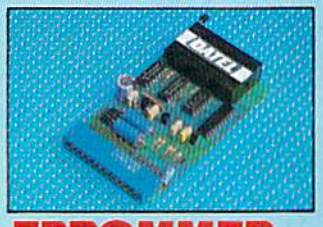

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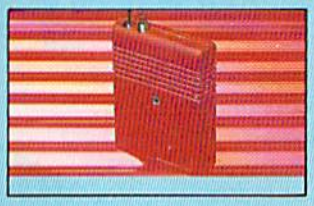

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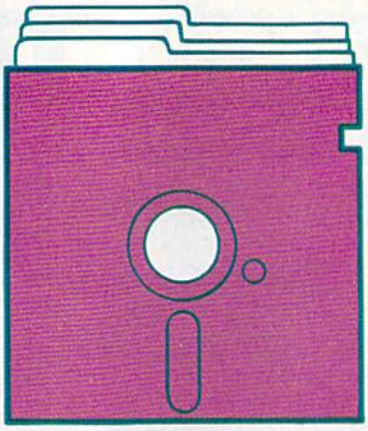

HANDY FILER

Walter L. Smith, Jr.

Keep track of your baseball cards, expenses, computer magazines—anything at all—with "Handy Filer," an easy-to-use file manager that allows you to enter, sort, and print your data. Its clear menus and prompts make the program a joy to use. For the 64 with a disk drive.

Database managers are complex and powerful tools which can be used to organize many different types of data. While "Handy Filer" is not a full-fledged database manager, it is flexible enough and powerful enough for many common data-management tasks. Its sorting, searching, and printing routines make it ideal for storing and retrieving many kinds of information.

File managers usually divide data into small, manageable groups called *records*. Records are further divided into *fields*. A good analogy is a recipe file. The box where you keep your recipe cards is similar to your data file, each card is like a record within the file, and each line on a card corresponds to a field within a record.

Handy Filer divides data into records that can be up to 255 characters long. Each record is further subdivided into fields. Fields can have a maximum length of 60 characters. Each record may contain anywhere from 1 to 255 fields. Your data file may contain as many records as will fit into memory.

Typing It In

Handy Filer is written entirely in machine language, so enter the program using the "MLX" machine language entry program found elsewhere in this issue. When MLX prompts you, respond with the values given below.

Starting address: $0801
Ending address: $1B70

Be sure to save a copy of Handy Filer to disk before you leave MLX. Although Handy Filer is written in machine language, you can load, run, and save it as if it were a BASIC program.

Creating a File

Getting started with Handy Filer is easy; simply load and run the program. You'll see the main menu with the following options:

(L) LOAD DISK FILE
(N) DEFINE NEW RECORD
(B) BEEP OFF
(Q) QUIT PROGRAM

The first time you run Handy Filer, you won't have any files on the disk, so you must create a new file with the DEFINE NEW RECORD option. Designing the format for your records is the most important step in using Handy Filer. You must decide how many fields you want to divide your data into, how long each field will be, and whether the field will be left- or right-justified.

You should keep a few things in mind while designing your record format:

- The first field of a record is considered the key field and must always contain data. The other fields may be left blank.
- Think of how you might want to sort and search for data within your records when you decide which fields to use. If you're making an address file and think you may want to sort it by zip code, be sure to assign the zip code to a separate field. If sorting by zip code isn't important to you, then you may want to put it in a field with the city and state.
- A field must be long enough to contain the longest entry expected, but if it's too long, memory is

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2400's are great (but quite expensive). Most users can't justify the cost difference unless they do a large amount of modem work with a service that can handle 2400 baud.

You will also notice a few very cheap 1200s on the market at "too good to be true prices." They are. The reason is that they are usually foreign built and not truly Hayes® and Commodore 1670® compatible therefore not usable in all situations and with all services.

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Busy Detect?	Yes	No	No	No
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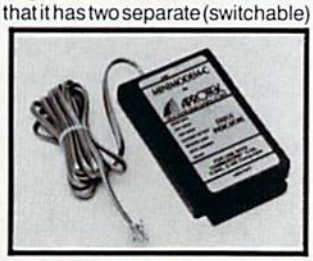

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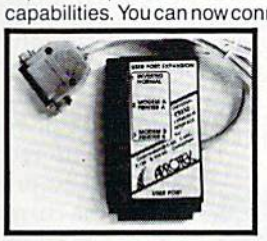

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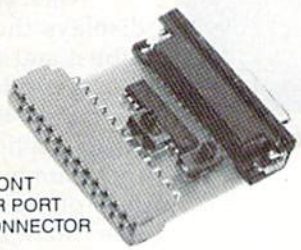

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wasted. Your whole file must fit into memory, so choose field sizes wisely. Also, remember that your whole record may be no more than 255 characters long.

- Justification not only affects how a field will look on the screen, but also how it will be sorted. Alphabetic fields must be left-justified in order for them to sort correctly. Numeric fields should be right-justified.

After you've decided how you want to structure your records, enter the format into Handy Filer. When you choose the DEFINE NEW RECORD option, Handy Filer prompts you for the title, length, and justification of each field in your record. If you try to define a field that is too long or try to define a field that will make the record too long, Handy Filer prints a warning and requests that you reenter the field length. After you've entered all your fields, press RETURN when prompted for the title of the next field.

Put your 64 to work with this fast and flexible database manager.

Entering Data

Once your record has been defined, a new option, (A) ADD RECORD, appears on the main menu. The ADD RECORD option lets you add data to your file.

When you choose the ADD RECORD option, Handy Filer prompts you for the data for each field of the record. Handy Filer indicates the length of the field by underlining it. If a field isn't underlined, it extends to the end of the current screen line. If you enter data beyond the end of the field, Handy Filer prints a warning and requests that you reenter the data. Handy Filer also asks whether you want to make changes to the record before it's saved. Just press RETURN if everything is OK. The record will be stored, and Handy Filer will prompt you for the next one. Press RETURN at the prompt for the first field to stop entering records.

Editing a File

When you return to the main menu this time, several new options are displayed:

(A) ADD RECORD
(E) EDIT/VIEW FILE
(L) LOAD DISK FILE
(N) DEFINE NEW RECORD
(P) PRINT FILE
(H) HUNT FOR RECORD
(F) SAVE FILE
(D) DELETE FILE
(V) VALIDATE DISK
(S) SORT FILE
(X) CHANGE RECORD FORMAT
(B) BEEP OFF
(Q) QUIT PROGRAM

The first new option, EDIT/VIEW FILE, displays the first record of the file and offers several options. You can move to the next or previous record of the file by pressing N or B, respectively. You can change the record you're currently viewing by pressing C, or you can delete the current record by pressing D. The EDIT/VIEW FILE option offers two print options. Type (press T) dumps the current screen to the printer. Print (press P) lets you define how the record will be printed.

When you press P, Handy Filer displays the current record print format and asks whether you want to change the format, print the record, view the record, or quit. The change option allows you to define the column and line at which each field of the record will start. If you don't want a field to be printed, set the starting column for that field to 0. Press P to print the record to the printer and V to print it on the screen. Pressing RETURN returns you to the EDIT/VIEW FILE screen. Press RETURN again to return you to the main menu.

Printing

The PRINT FILE option allows you to print all the records in the file or only those that match a search string. The PRINT FILE option differs from the print option available on the EDIT/VIEW FILE screen. PRINT FILE prints each record on a single line, and it prints more than one record.

When you select the PRINT FILE option, Handy Filer displays the current file print format and asks whether you would like to change the format, print the file, view the file, or print the records that match a specified string. The change option lets you specify where each field will begin on the line. As with printing records, enter 0 to prevent a field from printing. The print option prints to the printer. The view option prints to the screen.

The match-list option allows you to print or view records which contain a search string in a specific field. Handy Filer first asks which field you would like to search; then it asks for the string to search for. Pressing RETURN without entering a search string will return you to the PRINT FILE screen. After you've entered a search string, you can print the matching records, view the matching records, or return to the main menu.

Searching and Sorting

Handy Filer's HUNT FOR RECORD option makes locating specific information easy. Suppose, for example, that you have a data file containing information about your tape collection. If you know that you have a tape by the Byrds from 1971 but can't remember its name, you could use HUNT FOR RECORD to search for tapes released in 1971 or for albums released by the Byrds.

When you select the HUNT FOR RECORD option, Handy Filer asks you to choose which field to search and the string to search for. Simply type the string that you want Handy Filer to search for. Optionally, you can use the asterisk (*) character as a wildcard in your search string. For example, if you enter F* as the search string, Handy Filer might find records with *Fish* or *Fred* in the search field.

Handy Filer locates the first record that matches the search string and then asks if you want to continue searching. You may press RETURN to return to the main menu or Y to look for another match. If Handy Filer doesn't find a matching record, it returns to the main menu.

The SORT FILE option sorts the data file in ascending order according to a field-sort sequence. The first field in the sequence is the primary sort field. If two records have the same value in the primary sort field, the second field in the

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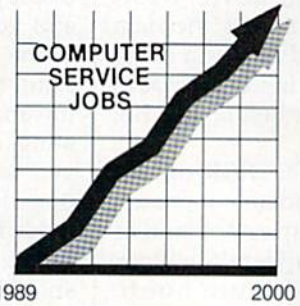

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field-sort sequence is used to sort those records. Handy Filer continues to use fields from the field-sort sequence as needed until similar records are sorted. Not all the fields in the record have to be included in the field-sort sequence. Only those fields included in the sequence are used in sorting the file.

When you select the SORT FILE option, Handy Filer displays the current field-sort sequence and asks whether you would like to change it. If you want to change the sequence, type Y and enter the fields' numbers in the order that you would like them used by the sort. After the field-sort sequence has been set, Handy Filer sorts the file and returns to the main menu.

Disk Options

Handy Filer has several disk options that make maintaining your data file easier.

The SAVE FILE option allows you to store your data file on disk. Be sure that you save your data file before exiting Handy Filer, or you will lose any changes that you have made to the file.

The LOAD DISK FILE option lets you retrieve data files stored on disk. Handy Filer displays a list of the data files on the disk in drive 8. Simply enter the number of the file you want to load.

The DELETE FILE option allows you to delete data files from your disk. As with LOAD DISK FILE, Handy Filer shows the data files on the disk and asks you to select one to delete. Handy Filer asks whether you're sure before deleting the file.

The VALIDATE DISK option executes a disk validate command. Validate will clean up any splat files on your disk and update the block allocation map. Be sure not to choose this option if there's a GEOS disk in the drive.

Other Options

The CHANGE RECORD FORMAT option allows you to redesign the record format of the file that is currently in memory. It should be used if you want to add a field, delete a field, or change the title, length, or justification of a field. The CHANGE RECORD FORMAT option is similar to the DEFINE NEW RECORD option. The difference is that CHANGE RECORD FORMAT lets you transfer data from the old record to the new one.

When you choose the CHANGE RECORD FORMAT option, the current record format is displayed at the top of the screen and you are prompted for the title of the first field in the new format. Enter the field title, length, and justification just as you did when creating a new record format. After you've entered the field justification, Handy Filer asks for the fill field. This is the number of the field in the current record format that should be placed in this field of the new format.

The BEEP option allows you to toggle beeping on and off. Handy Filer defaults to beeping when it expects input from the user.

The final option in the main menu is QUIT PROGRAM. This option returns you to BASIC. Be sure to save your data file before using this command if you've made changes to the file.

See program listing on page 99.

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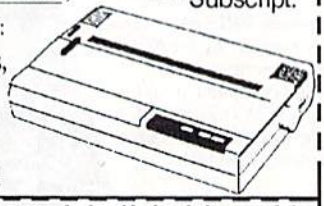

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the programmer's page

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Randy Thompson
Contributing Editor

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Commodore programmers are a rare breed. They're always looking for shorter, faster, more efficient ways to do things. For example, take a look at the following tips sent in by some of our readers.

Odd or Even?

An easy way to check whether a number is odd or even is to AND it with 1. If the result equals 1, the number is odd. If the result equals 0, the number is even. For example, the following code checks to see if the variable X is an even number:

```
10 IF X AND 1 = 0 THEN PRINT X;"IS
   AN EVEN NUMBER."
```

You can use this trick with any integer between −32768 and +32767, and it works on any Commodore computer.

Joseph R. Charnetski
Dallas, PA

Easy 40/80 Switching

Everybody knows that you can switch between the 40- and 80-column screens on the 128 by printing an ESC-X (PRINT CHR$(27) "X"), but did you know you can do the same thing with SYS 65375? When used from within a program, the SYS command is both shorter and easier to use.

Mike Prestwook
Milpitas, CA

Clearing the Hi-Res Screen

Clearing a hi-res screen from BASIC can take a very long time. With this one-liner, you can instantaneously clear the 64's hi-res screen located at 8192:

```
CLR:F=FRE(0):DIM A((−65536*(F<0)
  +F)/5−10):CLR
```

Using this code clears all BASIC program variables, so it's best to use it at the beginning of a program.

Chris Newton
Newcastle, NB

Missing Functions

Commodore BASIC for the 64 and 128 has a number of built-in mathematical functions, yet there are some very useful functions that BASIC does not provide. For example, although the SQR function returns the square root of a number, there is no function for returning other roots, such as the cube root. The following tips show you how to simulate some of these missing functions. (In each example, assume that the number being operated on is stored in the variable N.)

To find any root of N, use

```
X=N^(1/R)
```

where R is the root.

Commodore's LOG function returns the natural log, or log to base *e* (2.71828). To find the common log (log to base 10) of a number, use

```
X=LOG(N)/LOG(10)
```

EXP is similar to LOG except that it calculates the value of *e* raised to the power inside the parentheses. A more useful function would be one that returned the value of 10 raised to the power inside the parentheses. To find the value of 10 raised to the power N, use

```
X=EXP(N*LOG(10))
```

BASIC provides sin, cosine, and tangent functions but not secant, cosecant, or cotangent functions. To find the secant of any number, use

```
X=1/COS(N)
```

To find the cosecant, use

```
X=1/SIN(N)
```

To find the cotangent, use

```
X=1/TAN(N)
```

Vincent D. O'Connor
Babbitt, MN

Function-Key Flip

To redefine the 128's functions keys so they return the same ASCII value as on the 64, execute a POKE 828,183. To return the function keys to their default definitions, execute a POKE 823,173.

Earl Kanady
Las Vegas, NV

Free Blocks Revisited

Ever since we published the free-blocks tip in the October 1988 "Programmer's Page," several people have written in to suggest another, somewhat shorter method. Instead of the original

```
LOAD "$0:",8
LIST
```

many of you recommend using

```
LOAD "$$",8
LIST
```

It's true that the latter method saves you one character's worth of typing, but I chose to publish the first technique because it works *every* time you use it. When you use LOAD "$$",8 two times in a row, you get a FILE NOT FOUND error.

If you really want to save yourself the typing, try abbreviating the LOAD command with an L SHIFT-O or abbreviate the LIST command with an L SHIFT-I. To shorten the original tip even further, you can remove the 0 that precedes the colon. It's best to leave it in, however, because the 1541 often confuses itself with a dual disk drive and attempts to access a nonexistent drive 1. This single-/dual-drive identity crisis is one of the reasons why DOS's save-with-replace command is so flaky; it's also, I suspect, the reason why LOAD "$$",8 works only the first time you use it.

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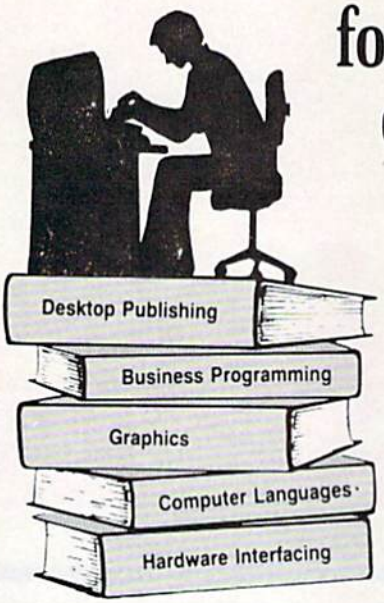

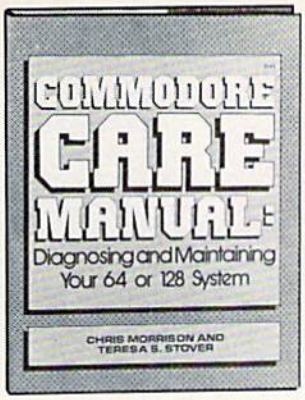

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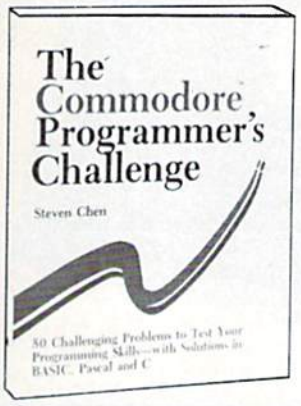

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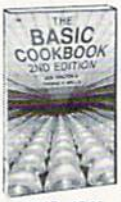

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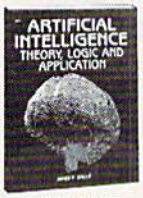

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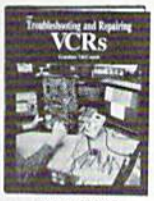

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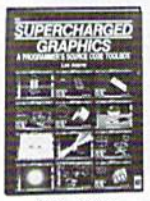

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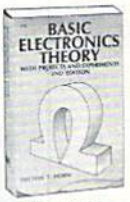

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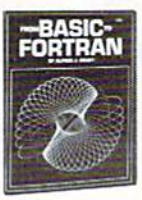

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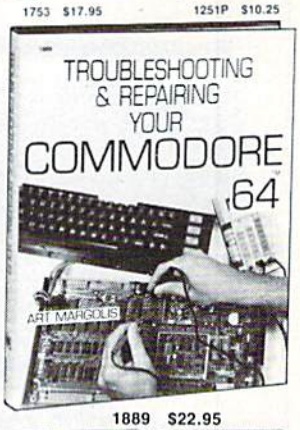

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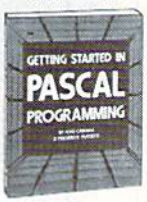

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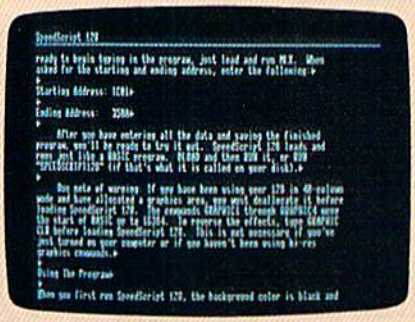

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Larry Cotton

Happy New Year. I hope your holidays were happy and that you benefited from the wish-list program presented last month—if not directly, at least from accumulating new knowledge of BASIC.

This month we'll finish explaining the program. Recall that there are seven subroutines that are accessed by the menu:

1. Add item(s) to list
2. Save list to disk
3. Load list from disk
4. Delete item from list
5. See list on screen
6. Print list
7. Quit

Loading Data from a Disk

We've covered the first two subroutines; next is the load-from-disk subroutine, which begins at line 330:

```
330 L$="":INPUT"{DOWN} NAME OF
    LIST TO LOAD";L$:IFL$=""THEN
    RETURN
```

This line is identical to line 280 from last month, except for the word *LOAD*. We're asking the user to type the name of a wish list that he or she has previously saved. Our example list title was WISH LIST 1, which was stored in L$.

We must now open a channel of communication with the disk drive:

```
340 OPEN1,8,0,L$
```

Again, this line is identical to one from last month (290), with one important exception: the secondary address of 0. Recall that the OPEN command opens a channel of communication. The number 1 is the file number. The 8 is the device number and indicates that we're communicating with the disk drive.

Now the all-important 0: This says that we intend to read data from a disk file. L$ is the name of the data file that the user entered at line 330. In order for a disk read to be successful, the drive must be able to find the exact name of the data file you saved (such as WISH LIST 1).

If you ran the program and saved a wish list to disk last month, did you look at the disk directory afterward? If so, you saw that the name of the file was labeled PRG (PRoGram) and it was annotated with a number in the left margin of the disk directory.

However, your data is not a program, and it cannot be run. The number in the left margin is the data's length, in blocks. About 254 characters are held in a block.

So far, we haven't actually loaded any data; we've only told the disk drive to get ready to load it. Next we use another BASIC statement, INPUT#, which reads the information from the disk drive.

```
350 INPUT#1,C:IFC=0THENPRINT
    "{DOWN} NO LIST FOUND":
    GOTO370
360 FORT=1TOC:INPUT#1,I$(T):NEXT
370 CLOSE1:GOSUB450:RETURN
```

INPUT# works similarly to INPUT (as in line 330), except that instead of getting information from the keyboard, it gets it from the disk. C holds the number of items in the wish list. If for some reason C is equal to 0 after the INPUT# statement, the message NO LIST FOUND is printed and the program jumps to line 370.

Line 360 uses a FOR-NEXT loop to load the data from the disk into the computer's memory as array I$( ). Line 370 closes the file, goes to a subroutine that prints the list and returns to print the menu.

Writing Parallel Lines

Note that program lines which get the name of the file from the user, open the channel, and write and read data to and from the disk drive are very similar.

When I write BASIC programs that communicate with the disk drive, I always write such lines in parallel form. This helps ensure that the data is loaded in exactly the same order and format as it was saved. This is extremely important.

First write the OPEN1,8,1,L$ (disk save) line. Let's say it's line 200. Then move the cursor back up to that line number and change it to a higher number—say, 300. Cursor over to the *second* 1 and change it to 0. You've created your OPEN1,8,0,L$ (disk load) line.

Similarly, when you write the PRINT# lines (with numbers in the 200s), cursor back up to those lines, change the line numbers to numbers in the 300s, and type *INPUT#* over *PRINT#*. This way the information will always be saved and loaded in exactly the same order, and with the correct, corresponding syntax: 1 goes with PRINT#, and 0 goes with INPUT#.

Last month I said this would not be a tutorial on communicating with peripherals—so we'll leave our discussion of disk activities here. You should understand enough to do simple disk saves and loads. The delete-item subroutine is next. It gets a little tricky, so follow closely.

Deleting Items

Remember that we're storing our wish list as an array I$( ), in which C keeps track of the number of items in the list. At any given moment, while running the program, you can press the RUN-STOP key; for example, if you want to see what the third item on the list is, type—in the immediate mode—PRINT I$(3).

The first line of the delete-item subroutine just checks to see if that count is 0 (no items entered); if so, the subroutine returns

```
380 IFC=0THENRETURN
```

The next line starts a FOR-NEXT loop that prints—one at a time—the items and their corre-

sponding numbers, which have already been entered. For each increment of T, the screen is cleared and the cursor is positioned two lines down:

```
390 FORT=1TOC:PRINT"{CLR}{2
    DOWN}":PRINTT;I$(T)
```

The next two lines print brief instructions to the user:

```
400 PRINT"{DOWN} PRESS RETURN
    TO CONTINUE OR
410 PRINT"{DOWN} SPACE BAR TO
    DELETE ITEM
```

Line 420 contains a new BASIC function, which we'll just touch on this month—CHR$( ):

```
420 GETA$:IFA$<>CHR$(13)ANDA$
    <> "{SPACE}"THEN420
```

Our familiar GET statement waits for the user to press either the RETURN key or the space bar. If neither is pressed, the program loops at this line. By using <> (not equal to), we ensure that no other key will elicit a response.

Why did we use CHR$(13) to detect the RETURN key? Each character in a computer's set of characters has a code number assigned to it—even a carriage return, which is produced by pressing RETURN. You can detect which key (or combination of keys) is pressed by checking for the resulting CHR$ value. Because a space is CHR$(32), line 420 could have been

```
420 GETA$:IFA$<>CHR$(13)ANDA$
    <>CHR$(32)THEN420
```

We'll cover CHR$ and its related function ASC more thoroughly in a future column. Let's get back to the program.

```
430 IFA$=CHR$(13)THENNEXT:
    RETURN
```

If the RETURN key is pressed, the FOR-NEXT loop started at line 390 will continue; more items and their numbers will be printed on the screen. Here's the tricky line:

```
440 FORZ=TTOC:I$(Z)=I$(Z+1):NEXT:
    C=C-1
```

If the space bar is pressed, control falls through to line 440. Remember what we're trying to do: delete an entry. So we introduce another (nested) FOR-NEXT statement, which loops through the entry to be deleted plus all the remaining entries and replaces each one with its succeeding entry. As an example, here's part of the I$( ) array from my wish list:

```
I$(1)="1989 CALENDAR"
I$(2)="THREE MAIDS A-MILKING"
I$(3)="HARD DISK DRIVE"
I$(4)="MORE MEMORY"
I$(5)="PEACE"
I$(6)="QUIET"
```

Say we want to be practical and delete I$(2)—three maids a-milking. It and all the remaining strings must—one by one—be replaced by the one after it. I$(2) must become I$(3), hard disk drive; I$(3) must become I$(4), more memory; and so on.

Lastly, the counter must be decremented by one, to compensate for the dropped string.

See the List

Three more subroutines to go. First, look at the one to see the screen, which should be self-explanatory:

```
450 IFC=0THENRETURN
460 PRINT"{CLR}":FORT=1TOC:
    PRINTT;I$(T):NEXT
470 PRINT"{DOWN} PRESS ANY KEY
    FOR MENU.
480 GETA$:IFA$=""THEN480
490 RETURN
```

Here's the subroutine for sending the wish list to a printer:

```
500 IFC=0THENRETURN
510 PRINT"{DOWN} PRINTING...
520 OPEN4,4:FORT=1TOC:
    PRINT#4,I$(T):NEXT:PRINT#4:
    CLOSE4:RETURN
```

Line 500 has been seen before as 270, 380, and 450. Line 510 prints a message to let the user know what's going on.

Line 520 is the heart of this subroutine. We open the communication channel with OPEN. It has become conventional to use two 4s when a Commodore computer talks to a printer. They correspond, as when communicating with a disk drive, to the file and the device numbers, respectively.

The file number doesn't make much sense when addressing a printer; however, it is required by the syntax following OPEN. What isn't required is the third number, as when communicating with a disk drive. Omitting the third number is equivalent to using 0 as the third value.

Now that the channel is open, we use a FOR-NEXT loop and PRINT# to send the data to the printer as the I$(C) array, much as we sent it to the disk drive.

To close communications with a printer, use PRINT#4:CLOSE4. The subroutine ends with the usual RETURN.

Lines 500–520 can be replaced with these if you don't have a printer:

```
500 PRINT"{DOWN} NO PRINTER
    HERE":PRINT"{DOWN} PRESS
    ANY KEY TO CONTINUE...
510 GETA$:IFA$=""THEN510
520 RETURN
```

Quitting

Lines 530–560 contain the subroutine that permits the user to end the program:

```
530 PRINT:"{DOWN}" ARE YOU
    SURE?
540 GETA$:IFA$=""THEN540
550 IFA$="Y"THENEND
560 RETURN
```

The only line that needs explanation is 550. This is a safe-end technique; it allows the user only one keypress to end the program—Y (for Yes). If any other keypress is made, the program returns to the menu.

Over the next several months, we'll have coverage of CHR$, ASC, error messages, DEF FN, and much more. Stay with us in 1989.

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machine language programming

String Passing

Jim Butterfield
Contributing Editor

Many BASIC programmers avoid the annoying INPUT command by writing custom input routines using the GET command. The problem is that in doing so, they often run into new problems, such as garbage collection delays.

Can a short machine language module be written to do this input without the drawbacks of the BASIC commands? Yes, but there's a hitch. A machine language program can scoop in a string from BASIC with ease, but it has a devil of a time passing this string back to the BASIC calling program. BASIC strings are tricky, and different Commodore computers build them in differing ways.

When a BASIC program creates a string with a command such as INPUT X$, a number of complex events take place. An entry for X$ is made in the table of BASIC variables. The system inputs the string to a buffer area and measures how long it is. The BASIC interpreter goes looking through memory for a space big enough to hold this string. If it finds the space, it copies the string there, then marks off the area as used.

There's more. Pointers are set up. If the memory space is not found, more things happen. BASIC strings can be complicated from the ML programmer's point of view. (And that's not even mentioning the extra things that the 128 does to avoid garbage problems.)

You don't want to do all this in your machine language routine—at least, not if you can avoid it.

One solution to the problem is this: Let BASIC make a string wherever it wants to do so in memory. Now a machine language program can receive keyboard input and deliver it directly into the existing BASIC string. When the ML program returns to BASIC, the string will then contain the information.

This method is often named *string thing*. We'll use it in a moment. But first I need to point out a few things we'll be watching for.

We must be sure that we don't run beyond the string's storage area. If the string is generated by BASIC to be ten characters long, we must accept no more than ten characters.

On the other hand, if the input string is not as long as the space provided by BASIC, we must find some way to signal BASIC, telling it how many characters we have actually supplied.

A String Thing

Let's look at the code of a simple string-thing program. This program does not have special code for such features as recognizing the DELETE key or furnishing a prompt signal. These features are easy to add.

As written, this program works on the Commodore 64 only, or on the 128 in 64 mode. A 128-mode version would need extra code to allow for memory banking.

The first thing to do is to find the string so that we know how long it is and where it is located. We will assume that the string variable is the first variable used in the program. This will save us code, since it tells us that the string data will be at the start of the variable table.

The variable table starts at a location pointed to in addresses $2D and $2E (the "start-of-variables" pointer). The first variable is assumed to be the one we want. The first two bytes contain the variable name. We don't need this, so we'll start off with a 2 in the Y register:

```
0380  LDY  #$02
```

This loop copies the bytes in the variable table into addresses $8B–$8E. The first three bytes are the descriptor: $8B gives the string length, $8C/D give its address. $8E contains a 0.

```
0382  LDA  ($2D),Y   (Variable element)
      STA  $0089,Y
      INY
      CPY  #$06
      BNE  $0382
```

Here comes our main GET loop. We GET a character; if it's binary 0, we return immediately to the GET statement, since there no character was received. Then we check to see whether the character is a RETURN, in which case we leave the loop:

```
038C  JSR  $FFE4    (GETIN)
      BEQ  $038C
      CMP  #$0D     (RETURN?)
      BEQ  $03A5
```

We have a character, and it's not RETURN. We will get the character count from address $8E (initially, there will be a 0 there), and check to see that it's not at the string size limit (the value of which is stored in $8B). If we have hit the limit, we ignore the character:

```
      LDY  $8E      (Count)
      CPY  $8B      (Limit?)
      BCS  $038C
```

It appears to be an acceptable character. We echo it and store it in the string (position Y, right?). Then we add 1 to Y, store it in $8E, and go back:

```
      JSR  $FFD2    (Print)
      STA  ($8C),Y  (Store in string)
      INY           (Increment count)
      STY  $8E
      BNE  $038C    (Always branch)
```

When we see a RETURN, we're finished. We need only echo it (moving us to a fresh screen line), and then we can return to BASIC. We could code JSR (Jump to SubRoutine) followed by RTS (ReTurn from SubRoutine), but it's just as easy to JMP (JuMP) to the subroutine and let it return to BASIC on our behalf:

```
03A5  JMP  $FFD2    (Print and exit)
```

For an example BASIC listing, see page 106.

The Brain's Tricks

Rhett Anderson
Assistant Editor

Scientists are finally beginning to unlock the mysteries of the human brain. It's a difficult job (and it'll be a long one), but they have already uncovered many interesting facts. Among them: The brain's speed is due to its use of parallelism and associative memory.

How does your Commodore 64 stack up against your brain? In general, not too well. Take a few minutes to think about the things that your brain does all day and all night. Think of all the decision making you do, but don't forget those tasks like keeping the heart beating and the lungs pumping. Don't leave out the monitoring of the senses. And don't forget the unconscious—your dreams are far beyond the imaginative and even the logical powers of any program ever written. Finally, consider the most amazing form of thinking: thinking about thinking.

The 64 should seem a pretty pathetic beast after that exercise, but let's spend a few more paragraphs putting it down. Only by understanding its limitations can we appreciate its power. First, consider that the 64 is basically a single-tasking machine—it can do only one thing at a time. That means that if you hooked your 64 up to a jaw and a pair of legs, it couldn't walk and chew gum at the same time.

Serial vs. Parallel

Most microprocessors think in serial. (The 6502 used in the Commodore 64 does. So does the 68000 used in the Amiga.) That means that the processor executes one operation at a time. Load the number 4, add the number stored in memory location 49152, store the result in memory location 2048. This limitation is called the *Von Neumann bottleneck.* (Engineers call a structure a bottleneck when it is the limiting factor of performance. For instance, the neck is the limiting factor of the speed of pouring when you empty a bottle of Pepsi.)

It's a nasty turn of history that leaves John Von Neumann's name best known as a kind of bottleneck. John Von Neumann was a mathematical genius whose contributions in the 1940s and 1950s included the recognition of the advantages of binary storage and the stored-program concept. Before EDVAC (a computer designed by Von Neumann), computers had to be hand-wired *for each program.* More than anyone else, Von Neumann is responsible for the architecture of the Commodore 64 and nearly every computer built. It's a testament to Von Neumann that only recently have we begun to build machines which leave the bottleneck behind.

Your brain thinks in parallel. Sensory information is gathered, impulses to muscles are sent out, logical thinking is carried out—all at the same time. A parallel system can emulate a serial one. You're thinking in serial when you reason that (1) you're holding an apple and (2) all apples are fruits, so (3) you're holding a fruit.

The brain thinks in parallel because it consists of billions of neurons, each one communicating with many others. Neurons are relatively simple compared to the single (very complex) computing element used by the 64.

New computers, like the Transputer and The Connection Machine, are moving more toward the brain's system. These computers make do with many (though not so many as are in a human brain) simple (though not so simple as a neuron) computing elements.

Associative Memory

For a computer to remember a fact, it must know where that fact is stored. If it doesn't know, it will have to search its entire memory for that fact. A human brain remembers differently. You might remember the layout of your grandmother's kitchen when you smell pancakes. This kind of remembering depends on associative memory (memory by association).

Researchers are hard at work to develop associative memory systems. Database programs could take advantage of associative memory to search huge databases in the blink of an eye. How much does Joe Smith owe on his account? Even with 100,000 names in a database, an associative memory system will find Joe's account in one step.

Is a 64 So Dumb?

So how stupid is the 64? Compared to your own brain, it's pretty dull. But it does what it was designed to do, and it does it well. Challenge your 64 to an adding contest in BASIC (a relatively slow computer language). Using paper and pencil, add up the 100 consecutive numbers which start at the number 98765. Then write a BASIC program which does the same thing. Your 64 will win handily. In fact, even beginning programmers could write this program, debug it, save it to disk, and run it before they could add even the first 25 numbers.

You'll find that the 64 is much more reliable than your own brain. If you can add the numbers without making a mistake, you're doing great. The 64 could run the program day and night for years without making a mistake.

There are things you can do that your 64 could never do. But there are things the 64 can do that you can't. For instance, you can't hook up your brain to a composite monitor to play a videogame.

You'll enjoy the experience of human brain and computer working together best when you understand the limitations and capabilities of both machines.

Where in the World?

Fred D'Ignazio
Contributing Editor

Last month I described the sorry state of Americans' geography education. I proposed that students might be motivated to learn more geography if they could fashion their own electronic field trips to faraway places.

Several programs for the Commodore 64 now enable children to take electronic field trips which offer two key ingredients that make geography come alive: First, they let children become "knowledge navigators" who chart their own paths across continents and bodies of information. Second, they give children a mission—a problem, mystery, crime to solve, or person to locate.

The most popular series of geography programs are the Carmen Sandiego programs from Brøderbund (P.O. Box 12947, San Rafael, California 94913-2947). The original *Where in the World Is Carmen Sandiego?* has been joined by *Where in the U.S.A. Is Carmen Sandiego?* and *Where in Europe Is Carmen Sandiego?*

Adults like the Carmen programs for their educational value and because they get this nice 1000-page *World Almanac* along with the program and manual (in *Where in the World*). But have you ever seen a kid reading an almanac just because it's a neat thing to do? Along comes Carmen, and kids are devouring almanacs, memorizing countries' flags, speed-reading their way through lists of national resources, and navigating across world political maps.

Charismatic Carmen

The secret is the character. Carmen, it seems, is a pretty charismatic woman—for boys, girls, *and* their parents and teachers. She's an ex-secret agent turned world-class thief. She and her gang are on a global crime spree, and it's up to your kids to bring her to justice.

The "hook" is the chase. Your kids want to catch Carmen. To get her, they'll do almost anything. They'll journey to 30 different cities and plow through arcane facts about countries' currencies, history, landmarks, culture, and geography. As they chase after Carmen, they learn to be more efficient in their pursuit. They begin taking notes; they decipher clues using their onboard Crime Computer and their almanac. And, as the chase continues, invisibly and with very little pain, they sharpen their reasoning and research skills.

The two successors to *Where in the World* feature similar attractions. *Where in the U.S.A.* offers *Fodor's USA Travel Guide; Where in Europe* has *Rand McNally's Concise Atlas of Europe.* Both challenge veteran Carmen chasers with more difficult chase scenarios and reward them by promoting them as detectives. The newer programs allow students to save their investigation on disk so they can return to it later. And *Where in Europe* has an online Crimestopper's Notebook and a Factfinder's Database, which teaches data-management skills.

A Mission You Can't Refuse

Less well-known, but also inviting, are the Ticket programs from Blue Lion Software (90 Sherman Street, Cambridge, Massachusetts 02140). They include *Ticket to Spain; Ticket to Washington, D.C.; Ticket to Paris; Ticket to London;* and *Ticket to Hollywood.*

These programs are appealing because, like the Carmen programs, they give the child a mission. Faraway cities are neat places to visit, but they become irresistible when you're challenged to go there for some mysterious purpose, when you have only so much cash to live on, when customs officials and hotel clerks stand in your path, or when the clock keeps ticking and you're running out of time.

Is This Critical Thinking, or What?

In *Ticket to Paris,* your mission is to locate your cousin, who is hidden somewhere in Paris and who has refused to return to the U.S. Your family hopes you can track him down and persuade him to come home with you. But in order to succeed, you have to master a myriad of details about French culture, currency, and language. You have to know Paris like you know the back of your hand. You have to solve all the little problems that confront real travelers when they visit a foreign land.

The ticket programs are remarkable in their accuracy (digitized pictures were taken of locations players visit) and in their constantly changing parameters—currency fluctuates, hotels fill up and change rates, and unpredictable events occur (you may end up in the hospital from fatigue or starvation if you don't look after yourself). I especially like the option to play each game in English or in the host country's language. And the programs are deliberately nonsexist, allowing a player to choose to be a male or female character.

The Carmen and Ticket programs are not perfect electronic field trips for your children. But they are welcome alternatives to textbooks as a means to stimulate interest in geography and to embed the study of geography in practical, real-life experiences and problems. Geography is, after all, only an abstraction. But the world is a very real place. Any tool that lets your child link geography to the real world is worth the investment.

Becoming a *geoPaint* Pro

Roger T. Conroy

Get the most out of* geoPaint, *no matter which version you use.

In the June 1988 *Gazette*, E. William Huffman discussed many helpful hints for *geoPaint* users. This article builds on those hints. Version 1.3 of *geoPaint* eliminates many of the problems that the author discussed. Version 1.3 offers many improvements, in addition to the bug fixes.

The latest version of the operating system, GEOS 2.0, features a further improved *geoPaint*. Regardless of the version you use, the hints given here should help you on your path to becoming a *geoPaint* pro. For this article, I'll refer to version 1.3 of *geoPaint*.

Rotations

The largest image that you can rotate is one that's 141 × 141 pixels in size (that's one pixel less than the height of the edit window). If you're not sure that the image you want to rotate is small enough, draw a box around your picture with the box tool. As you draw, watch the pixel size in the status box.

The Chart

When you're designing a page with *geoPaint*, you'll benefit if you first plan your page on paper. I use ¼-inch graph paper, which is available in pads at office supply, art, and stationery stores. If you use thin enough paper, you can trace pictures onto the graph paper.

With my Commodore MPS-1000 printer (which prints at 60 dpi), I find that a ¼-inch square translates into a box on the screen 18 pixels wide × 15 pixels high. With a geoPrint cable and a printer in IBM mode (at 80 dpi), use a box that's 20 × 17 pixels.

You can draw boxes on the screen to correspond to the boxes on the graph paper. Alternatively, you can draw just the intersections of the squares.

In the Cards

One very handy feature of *geoPaint* is the 8 × 8 pixel "cards" that control the background color. If you use the region tool with color turned on, the regions you select will snap to the dimensions of these cards. These cards are a result of the way the 64's video hardware works.

You can use these cards to make it easy to position your artwork on a page. To do so, follow these instructions.

First, use the color tool to change the background color to a pattern of gray and white squares. After you've built up a checkerboard of about 32 × 32 pixels (4 cards × 4 cards), copy this pattern to fill the entire edit window. Now, select the entire window and copy it to a scrap. Move down until you are free of the checkerboard and paste the scrap. The window scrolls down two cards at a time, so it's easy to fill the entire screen. When you've finished, save this checkerboard background to disk.

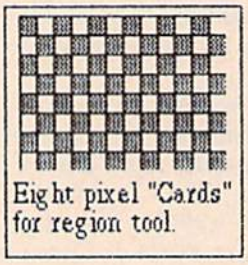
You can now draw an 8 × 8 or a 32 × 32 set of squares on the new document using the line tool in pixel-edit mode. Be sure to draw the lines on the upper and left edges of the squares. It's easy to copy a full edit window of these squares throughout the entire page. (See Figures 1 and 2.)

You should find that a grid based on eight-pixel groupings works better than one based on ten-pixel groupings. The region tool snaps around the cards when you save your clips to a photo scrap. Since you've changed the background color to a checkerboard, you'll know exactly what you're saving. The colored background does not print out, so you can leave it as part of the picture. A drawback to this method is that the checkerboard pattern is cleared to the default gray when you clear a region.

Enter *Print Shop*

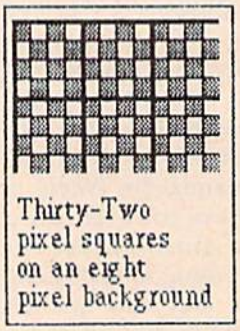
I have found that the cards are especially useful when I copy *Print Shop* graphics. To import *Print Shop* graphics, I use the "*Print Shop* to GEOS" converter from the April 1987 issue of *Gazette*. I outline the graphic in white on the background so that I know exactly where to cut and paste. I now have a whole page of graphics to use, each one exactly outlined. This makes it easy to paste them into albums for use with *geoPublish*. (See Figure 3.)

Figure 1



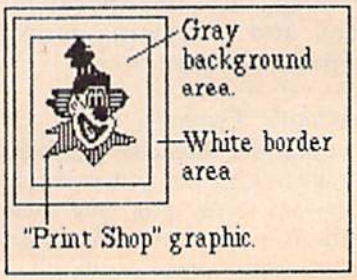
Eight pixel "Cards" for region tool.

Figure 2



Thirty-Two pixel squares on an eight pixel background

Figure 3



bug-swatter

• A reader has discovered a problem with October's "BASIC for Beginners" column:

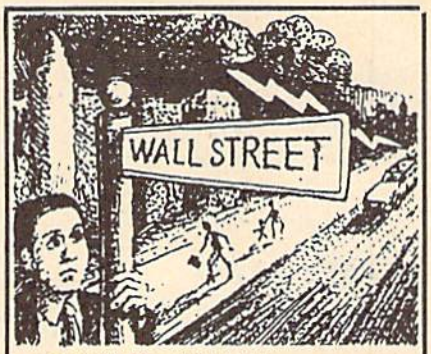
I couldn't help but notice that the average speeds are calculated incorrectly in "BASIC for Beginners—The Smalltown 500" in the October 1988 issue. Mr. Cotton's program calculates the average speed for the race by summing the speeds for each lap and dividing by the total number of laps. This method may seem intuitively correct, but it isn't.

Mathematical textbooks use the relationship distance = rate × time *to calculate speed. Based on this relationship, lap speed would be lap distance (I assume it's one mile) divided by lap time. Mr. Cotton's method of calculating average speed yields a value of 115.4 for car 1. The correct value is 115.135131. Speeds are calculated this way at Indianapolis; the Smalltown 500 shouldn't be an exception to the rule.*

Gordon Childs
Lancaster, PA

Three lines must be changed to correct Smalltown 500. The name of the array in line 20 must be changed from SP to TI because the array now contains the total time for the race instead of the speed. Line 60 must be changed to sum the times for each car instead of the speed. The time for each lap is calculated by dividing the distance (one mile) by the speed. Finally, line 120 must be changed to print the average speed using the formula *speed = distance / time.*

```
10 PRINTCHR$(147)
20 DIM S(4,5),TI(4)
30 FORC=1TO4
40 FOR L=1TO5
50 READ S(C,L)
60 TI(C)=TI(C)+1/S(C,L)
70 NEXTL:NEXTC
110 FORT=1TO4
120 PRINT"CAR"T"'S AVERAGE
    SPEED ="5/TI(T)
130 NEXTT
200 DATA 108,110,122,120,117
210 DATA 118,114,116,114,110
220 DATA 120,123,119,124,125
230 DATA 100,112,115,117,119
```

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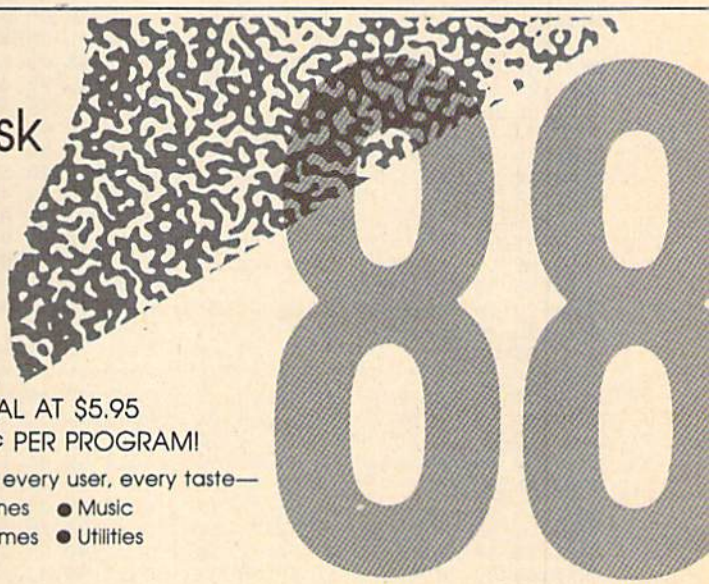

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BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

Jewel Grab

See instructions in article on page 50 before typing in.

```
0801:0D 08 0A 00 9E 28 32 30 05
0809:36 33 29 00 00 00 AD 0E 8F
0811:DC 29 FE 8D 0E DC A5 01 C2
0819:29 FB 85 01 A9 00 85 FA D0
0821:85 FC A9 D0 85 FB A9 30 15
0829:85 FD A2 00 A0 00 B1 FA 33
0831:91 FC C8 C0 FF D0 F7 E6 88
0839:FB E6 FD E8 E0 08 D0 EC 05
0841:A0 1F B9 55 12 99 E0 30 DE
0849:49 FF 99 E0 34 88 C0 FF 84
0851:D0 F0 A5 01 09 04 85 01 2F
0859:AD 0E DC 09 01 8D 0E DC 27
0861:A9 1C 8D 18 D0 A9 F7 85 23
0869:FA A9 13 85 FB A9 40 85 A8
0871:FC A9 38 85 FD A2 00 A0 E4
0879:00 B1 FA 91 FC C8 C0 40 3B
0881:D0 F7 18 A5 FA 69 40 85 D8
0889:FA A5 FB 69 00 85 FB 18 BC
0891:A5 FC 69 40 85 FC A5 FD 4E
0899:69 00 85 FD E8 E0 0F D0 A8
08A1:D6 A9 00 8D 3C 11 8D 3D DE
08A9:11 A9 FF 8D 1C D0 A9 07 04
08B1:8D 26 D0 A0 28 A9 06 99 C3
08B9:00 D0 C8 C0 2F D0 F8 A9 7B
08C1:E1 8D F8 07 A9 EF 8D FF DD
08C9:07 A0 18 B9 1B 11 99 00 74
08D1:D4 88 C0 FF D0 F5 A9 04 3C
08D9:8D 3E 11 A9 01 8D 43 11 D2
08E1:A9 06 8D 20 D0 A9 0E 8D D2
08E9:21 D0 A9 00 8D 25 D0 8D 24
08F1:86 02 8D 3A 11 8D 3B 11 61
08F9:8D 57 11 8D 75 12 A9 78 61
0901:8D 58 11 20 77 0E A9 C0 1C
0909:A0 11 20 1E AB AD 00 DC 86
0911:29 10 F0 19 20 E4 FF 38 38
0919:E9 31 C9 04 B0 EF A8 69 E5
0921:31 8D 21 04 B9 3F 11 8D 0E
0929:58 11 4C 0E 09 20 54 0E 95
0931:A9 20 8D 04 D4 AD 39 11 F2
0939:0D 45 11 D0 24 AD 00 DC 07
0941:8D 38 11 29 10 F0 08 A9 DA
0949:00 8D 44 11 4C 62 09 AD 04
0951:44 11 F0 03 4C 52 0A A9 81
0959:04 8D 39 11 A9 01 8D 44 B9
0961:11 20 FB 0F AD 38 11 29 0E
0969:12 D0 5B AD F8 07 C9 E4 5B
0971:90 05 A0 78 4C 7A 09 A0 A7
0979:7A B1 FA C9 20 F0 30 C9 20
0981:1F D0 43 AD 5A 11 C9 04 49
0989:F0 0F EE 5A 11 A9 20 91 5C
0991:FA AE 5A 11 A9 1F 9D 10 3E
0999:04 A9 7F 8D 38 11 A9 00 3A
09A1:8D 39 11 18 A9 0F 6D 5A 2B
09A9:11 20 B2 0D 4C 52 0A AD E0
09B1:5A 11 F0 E5 CE 5A 11 A9 5D
09B9:1F 91 FA AE 5A 11 A9 20 94
09C1:9D 11 04 4C 9A 09 AD 38 B8
09C9:11 C9 6F D0 4F A0 51 B1 23
09D1:FA C9 20 F0 1D C9 1E D0 04
09D9:43 AD 5B 11 C9 04 F0 3C F1
09E1:EE 5B 11 A9 20 91 FA AE EA
09E9:5B 11 A9 1E 9D 0A 04 4C 6E
09F1:07 0A AD 5B 11 F0 5A CE 45
09F9:5B 11 A9 1E 91 FA AE 5B 46
0A01:11 A9 20 9D 0B 04 A9 00 A1
0A09:8D 39 11 A9 7F 8D 38 11 A2
0A11:18 A9 0F 6D 5B 11 20 B2 66
0A19:0D 4C 52 0A A0 29 B1 FA B9
0A21:C9 1D F0 08 A0 51 B1 FA A8
0A29:C9 1D D0 25 A9 20 91 FA C1
0A31:18 AD 3A 11 69 64 8D 3A 47
0A39:11 AD 3B 11 69 00 8D 3B 5B
0A41:11 20 BB 0D A9 1E 20 B2 E6
0A49:0D CE 59 11 D0 03 4C EB EA
0A51:0D 20 FB 0F A9 10 8D 0B 18
0A59:D4 A9 00 8D 03 11 8D 05 97
0A61:11 AD 39 11 F0 2F A9 11 4A
0A69:8D 0B D4 38 A9 04 ED 39 97
0A71:11 18 69 28 8D 08 D4 CE C8
0A79:39 11 D0 05 A9 01 8D 45 8A
0A81:11 A0 01 B1 FA C9 20 F0 B1
0A89:04 C9 1D D0 08 A0 08 20 B5
0A91:5F 10 4C D1 0A A0 79 B1 77
0A99:FA C9 20 F0 0C C9 1D F0 63
0AA1:08 A9 00 8D 45 11 4C D1 D5
0AA9:0A A0 29 B1 FA C9 1E F0 57
0AB1:F0 A0 51 B1 FA C9 1E F0 D7
0AB9:E8 A0 08 20 75 10 EE 45 7C
0AC1:11 A9 11 8D 0B D4 A9 28 EA
0AC9:69 04 ED 45 11 8D 08 D4 49
0AD1:AD 38 11 29 08 D0 23 A0 E9
0AD9:52 B1 FA C9 20 F0 08 C9 1E
0AE1:1E F0 04 C9 1D D0 13 A0 51
0AE9:08 20 C8 10 A2 00 20 DD 57
0AF1:0F AE 47 11 BD 4B 11 8D FD
0AF9:F8 07 AD 38 11 29 04 D0 8B
0B01:23 A0 50 B1 FA C9 20 F0 26
0B09:08 C9 1E F0 04 C9 1D D0 BA
0B11:13 A0 08 20 8B 10 A2 00 BD
0B19:20 DD 0F AE 47 11 BD 4F CC
0B21:11 8D F8 07 AD 38 11 29 4C
0B29:01 D0 27 A0 29 B1 FA C9 B2
0B31:1E F0 0C C9 1D F0 08 A0 0E
0B39:51 B1 FA C9 1E D0 13 A0 5B
0B41:08 20 5F 10 A2 01 20 DD 87
0B49:0F AE 48 11 BD 53 11 8D 97
0B51:F8 07 AD 38 11 29 02 D0 E0
0B59:2B A0 79 B1 FA C9 1E F0 A3
0B61:10 C9 1D F0 0C C9 20 D0 3D
0B69:1B A0 51 B1 FA C9 1E D0 86
0B71:13 A0 08 20 75 10 A2 01 6E
0B79:20 DD 0F AE 48 11 BD 53 39
0B81:11 8D F8 07 20 EE 0F AD 9B
0B89:8E 02 F0 25 A0 12 B9 9A 33
0B91:05 99 42 12 B9 2F 12 99 42
0B99:9A 05 88 C0 FF D0 EF AD 2C
0BA1:8E 02 D0 FB A0 12 B9 42 5C
0BA9:12 99 9A 05 88 C0 FF D0 EA
0BB1:F5 20 E4 FF F0 19 C9 52 39
0BB9:D0 03 4C EB 0D C9 51 D0 44
0BC1:0E A9 00 8D 18 D4 8D 15 66
0BC9:D0 A9 93 20 D2 FF 60 AD 2C
0BD1:5D 11 F0 06 CE 5D 11 4C B3
0BD9:C2 0C AD 57 11 F0 03 4C 1E
0BE1:C2 0C AD 5C 11 8D 55 11 52
0BE9:AE 55 11 CA 8E 56 11 BD 29
0BF1:71 11 F0 1B DE 71 11 BD 71
0BF9:71 11 A8 B9 8D 11 9D F9 A3
0C01:07 AD 60 11 9D 75 11 A9 B3
0C09:41 8D 12 D4 4C BA 0C BD D7
0C11:F9 07 49 03 9D F9 07 E8 0D
0C19:8E 03 11 8A 0A 8D 05 11 A5
0C21:CA AC 5E 11 BD 85 11 F0 BD
0C29:06 20 C8 10 4C 33 0C 20 CD
0C31:8B 10 AC 5E 11 AE 56 11 8F
0C39:BD 89 11 F0 06 20 5F 10 43
0C41:4C 47 0C 20 75 10 AE 56 74
0C49:11 DE 6D 11 F0 03 4C BA 47
0C51:0C DE 75 11 D0 19 A9 09 2E
0C59:9D 71 11 AD 00 D0 9D 79 91
0C61:11 AD 01 D0 9D 7D 11 AD 4D
0C69:10 D0 29 01 9D 81 11 AD B5
0C71:5F 11 9D 6D 11 8A 0A AA 79
0C79:BD 02 D0 AE 56 11 38 FD 5B
0C81:79 11 8D 03 11 AD 10 D0 AC
0C89:3D 08 11 F0 02 A9 01 FD 2A
0C91:81 11 0D 03 11 90 05 A9 FE
0C99:00 4C 9F 0C A9 01 9D 85 8B
0CA1:11 8A 0A AA BD 03 D0 AE 1B
0CA9:56 11 DD 7D 11 90 05 A9 43
0CB1:01 4C B7 0C A9 00 9D 89 27
0CB9:11 CE 55 11 F0 03 4C E9 DF
0CC1:0B AD 1E D0 8D 03 11 29 5F
0CC9:81 C9 81 D0 36 A9 51 8D DA
0CD1:57 11 18 AD 3A 11 69 C8 69
0CD9:8D 3A 11 AD 3B 11 69 00 35
0CE1:8D 3B 11 20 BB 0D A0 28 2F
0CE9:B9 FF 03 09 80 99 FF 03 3D
0CF1:A9 02 99 FF D7 88 D0 F0 06
0CF9:AD 15 D0 29 7F 8D 15 D0 08
0D01:4C 90 0D AD 03 11 29 01 91
0D09:D0 03 4C 90 0D CE 3E 11 10
0D11:AD 3E 11 C9 FF D0 33 A9 A3
0D19:00 8D 04 D4 8D 0B D4 8D 34
0D21:12 D4 A9 E9 A0 11 20 1E F4
0D29:AB A2 00 A0 06 18 20 F0 8D
0D31:FF AD 3D 11 AE 3C 11 20 18
0D39:CD BD A9 28 8D 55 11 20 65
0D41:EE 0F CE 55 11 D0 F8 4C CF
0D49:AA 08 8D 1E D0 A9 05 8D 13
0D51:55 11 AD 40 03 8D 03 11 79
0D59:A9 55 8D 40 03 A9 10 8D BF
0D61:0B D4 8D 12 D4 18 AD 55 C0
0D69:11 69 05 20 B2 0D 20 EE 02
0D71:0F A9 0F 20 B2 0D 20 EE 5A
0D79:0F CE 55 11 D0 DF A9 20 04
0D81:8D 04 D4 AD 03 11 8D 40 90
0D89:03 20 77 0E 20 54 0E A9 15
0D91:40 8D 12 D4 AD 57 11 F0 9C
0D99:15 CE 57 11 AD 57 11 4A 25
0DA1:A8 B9 FF 03 29 7F 99 FF 29
0DA9:03 A9 00 99 FF D7 4C 31 72
0DB1:09 8D 01 D4 A9 41 8D 04 92
0DB9:D4 60 A2 00 A0 22 18 20 88
0DC1:F0 FF AD 3B 11 AE 3A 11 86
0DC9:20 CD BD 38 ED 3C 11 8D B2
0DD1:03 11 AD 3B 11 ED 3D 11 E6
0DD9:0D 03 11 90 0C AD 3A 11 03
0DE1:8D 3C 11 AD 3B 11 8D 3D 45
0DE9:11 60 AD 3E 11 C9 0A F0 F2
0DF1:03 EE 3E 11 EE 75 12 AD 41
0DF9:75 12 C9 06 F0 09 20 77 50
0E01:0E 20 54 0E 4C 31 09 A9 7A
0E09:00 8D 75 12 EE 43 11 AD AC
0E11:43 11 C9 05 F0 09 20 77 FF
0E19:0E 20 54 0E 4C 31 09 A9 92
0E21:00 8D 18 D4 A9 06 A0 12 A9
0E29:20 1E AB A9 03 8D 56 11 F8
0E31:A9 08 8D 55 11 A0 28 AD 34
0E39:55 11 99 FF D7 88 D0 FA F4
0E41:20 EE 0F 20 EE 0F CE 55 B3
0E49:11 D0 EA CE 56 11 D0 E0 E5
0E51:4C AA 08 A9 10 8D 05 D4 6F
0E59:8D 0B D4 8D 12 D4 A9 96 40
0E61:A0 11 20 1E AB AC 3E 11 95
0E69:F0 08 A9 1C 99 FF 03 88 52
0E71:D0 FA 20 BB 0D 60 A9 93 45
0E79:20 D2 FF A9 A0 A0 28 99 66
0E81:BF 07 88 D0 FA A9 18 8D 99
0E89:00 D0 A9 E2 8D 01 D0 A9 F8
0E91:00 8D 10 D0 8D 57 11 8D 99
0E99:44 11 8D 39 11 8D 45 11 BB
0EA1:A9 01 8D 15 D0 AD 75 12 10
0EA9:0A AA BD 76 12 85 FC BD F2
0EB1:77 12 85 FD A0 00 8C 5B 18
0EB9:11 8C 5A 11 B1 FC 8D 55 CF
0EC1:11 20 C0 0F C8 B1 FC 8D 0C
0EC9:56 11 A9 5F 20 D2 FF CE 9B
0ED1:56 11 D0 F6 CE 55 11 D0 A5
0ED9:E8 C8 B1 FC 8D 55 11 20 A6
0EE1:C0 0F C8 B1 FC 8D 56 11 32
0EE9:A9 5E 20 D2 FF A9 11 20 8C
0EF1:D2 FF A9 9D 20 D2 FF CE A1
0EF9:56 11 D0 EC CE 55 11 D0 2D
0F01:DE C8 B1 FC 8D 59 11 8D 48
0F09:55 11 20 C0 0F A9 5D 20 20
0F11:D2 FF CE 55 11 D0 F3 AD 29
0F19:43 11 8D 5C 11 4A 8D 03 64
0F21:11 C8 B1 FC 38 ED 03 11 90
0F29:8D 5E 11 C8 B1 FC 8D 5F 50
0F31:11 C8 B1 FC 8D 60 11 C8 E8
0F39:B1 FC 8D 0E D0 C8 B1 FC 0C
0F41:8D 0F D0 AE 5C 11 8E 55 88
0F49:11 CA AD 10 D0 1D 65 11 30
0F51:8D 10 D0 AD 15 D0 1D 17 6C
0F59:11 09 80 8D 15 D0 AE 55 C9
0F61:11 CA 8A 0A A8 BD 61 11 BC
0F69:99 02 D0 BD 69 11 99 03 90
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4. At the U#=prompt enter **XJM11740,GEnie** then RETURN.

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0F71:D0 A5 A2 29 01 9D 85 11 E2
0F79:9D 89 11 A5 A2 09 01 29 A9
0F81:07 9D 6D 11 A9 00 9D 71 43
0F89:11 A5 A2 09 01 29 07 9D D6
0F91:75 11 AD 00 D0 9D 79 11 65
0F99:AD 01 D0 9D 7D 11 AD 10 5E
0FA1:D0 29 01 9D 81 11 A9 E9 F9
0FA9:9D F9 07 20 EE 0F CE 55 9E
0FB1:11 D0 AB A9 0A 8D 5D 11 EE
0FB9:AD 1E D0 8D 1E D0 60 C8 E6
0FC1:B1 FC 8D 34 11 C8 B1 FC F8
0FC9:8D 36 11 8C 03 11 AC 34 11
0FD1:11 AE 36 11 18 20 F0 FF 1F
0FD9:AC 03 11 60 FE 47 11 BD 2C
0FE1:47 11 DD 49 11 D0 05 A9 B7
0FE9:00 9D 47 11 60 AC 58 11 E0
0FF1:AE 58 11 CA D0 FD 88 D0 AC
0FF9:F7 60 AD 01 D0 8D 36 11 2C
1001:85 FA AD 00 D0 8D 34 11 8E
1009:A9 00 8D 35 11 8D 37 11 41
1011:85 FB AD 10 D0 29 01 F0 C7
1019:03 EE 35 11 A0 03 4E 35 11
1021:11 6E 34 11 88 D0 F7 0E 82
1029:36 11 2E 37 11 0E 36 11 20
1031:2E 37 11 18 A5 FA 6D 36 04
1039:11 85 FA A5 FB 6D 37 11 12
1041:85 FB 18 A5 FA 6D 34 11 87
1049:85 FA A5 FB 69 00 85 FB B1
1051:18 A5 FA 69 DA 85 FA A5 65
1059:FB 69 02 85 FB 60 AE 05 2E
1061:11 DE 01 D0 BD 01 D0 C9 4C
1069:3A B0 05 A9 3A 9D 01 D0 29
1071:88 D0 EE 60 AE 05 11 FE 98
1079:01 D0 BD 01 D0 C9 E5 90 20
1081:05 A9 E5 9D 01 D0 88 D0 52
1089:EE 60 AE 05 11 DE 00 D0 34
1091:AE 03 11 AD 10 D0 3D 07 0C
1099:11 D0 12 AE 05 11 BD 00 8B
10A1:D0 C9 18 B0 1E A9 18 9D 10
10A9:00 D0 4C C4 10 AE 05 11 2A
10B1:BD 00 D0 C9 FF D0 0C AE 71
10B9:03 11 AD 10 D0 3D 0F 11 01
10C1:8D 10 D0 88 D0 C4 60 AE 58
10C9:05 11 FE 00 D0 AE 03 11 E8
10D1:AD 10 D0 3D 07 11 D0 17 EF
10D9:AE 05 11 BD 00 D0 D0 1E 93
10E1:AE 03 11 AD 10 D0 1D 07 1C
10E9:11 8D 10 D0 4C FF 10 AE 36
10F1:05 11 BD 00 D0 C9 49 90 61
10F9:05 A9 49 9D 00 D0 88 D0 2F
1101:C6 60 00 00 00 00 01 02 A2
1109:04 08 10 20 40 80 FE FD 33
1111:FB F7 EF DF BF 7F 02 06 31
1119:0E 1E 00 00 00 08 00 00 E9
1121:F4 00 00 00 00 00 00 F0 AE
1129:00 0F A5 03 00 00 64 00 BC
1131:00 00 0F 00 00 00 00 00 35
1139:00 00 00 00 00 00 78 6E BA
1141:64 5A 00 00 00 00 00 00 2C
1149:04 02 E1 E2 E3 E2 E4 E5 B2
1151:E6 E5 E7 E8 00 00 00 00 EB
1159:00 00 00 00 00 00 00 00 7B
1161:1E 37 37 A5 00 04 0C 0C D5
1169:32 32 DC 32 00 00 00 00 EF
1171:00 00 00 00 00 00 00 00 93
1179:00 00 00 00 00 00 00 00 9B
1181:00 00 00 00 00 00 00 00 A3
1189:00 00 00 00 EA EB EC ED 7A
1191:EE ED EC EB EA 13 90 20 E7
1199:20 20 20 20 20 20 20 20 BB
11A1:20 20 20 20 20 20 20 20 C3
11A9:20 20 20 20 20 20 20 20 CB
11B1:20 20 20 53 43 4F 52 45 66
11B9:20 20 20 20 20 20 00 13 8E
11C1:20 20 20 2A 2A 20 50 52 67
11C9:45 53 53 20 46 49 52 45 11
11D1:20 54 4F 20 53 54 41 52 C5
11D9:54 20 28 53 50 45 45 44 CE
11E1:3D 31 29 20 2A 2A 20 00 50
11E9:13 48 49 47 48 20 20 20 68
11F1:20 20 20 20 20 2A 2A 20 50
11F9:47 41 4D 45 20 4F 56 45 3E
1201:52 20 2A 2A 00 13 20 20 EA
1209:20 20 20 20 20 20 20 20 2D
1211:20 20 20 2A 2A 20 59 4F C7
1219:55 20 57 49 4E 21 20 2A D0
1221:2A 20 20 20 20 20 20 20 4A
1229:20 20 20 20 20 00 2A 2A EA
1231:2A 20 07 01 0D 05 20 10 30
1239:01 15 13 05 04 20 2A 2A F4
1241:2A 00 00 00 00 00 00 00 7A
1249:00 00 00 00 00 00 00 00 6D
1251:00 00 00 00 18 18 12 3E F8
1259:50 1C 62 82 92 10 38 FE 65
1261:38 10 92 00 C3 FF FF C3 D9
1269:C3 FF FF C3 FF 42 24 18 15
1271:18 24 42 FF 00 82 12 AB CC
1279:12 E5 12 1A 13 38 13 96 3A
1281:13 04 02 11 11 00 09 05 21
1289:09 09 0A 14 09 06 03 0B 68
1291:04 05 0C 03 06 13 09 0F 48
1299:06 02 02 0C 01 08 0E 1E A4
12A1:07 26 07 26 13 08 0A 0A EC
12A9:D2 50 07 0C 04 07 14 04 55
12B1:07 08 09 05 1A 09 05 09 D4
12B9:0D 07 16 0D 07 02 12 25 43
12C1:03 13 02 10 01 12 06 26 EF
12C9:12 06 0A 0D 02 19 02 01 04
12D1:04 26 04 10 06 17 06 0A A5
12D9:0B 1B 0B 10 14 16 14 08 D5
12E1:05 0F AA C8 07 00 04 02 70
12E9:09 06 06 0F 0B 06 09 14 5C
12F1:06 0F 12 06 15 10 07 20 96
12F9:10 07 02 08 14 04 25 02 A5
1301:0E 09 01 03 0B 04 25 01 74
1309:11 09 03 0C 18 0D 11 0F 41
1311:0B 11 1E 15 05 0A 05 AA 1B
1319:C8 01 06 0D 0A 01 20 03 0D
1321:15 08 06 0A 0C 0A 20 01 FE
1329:10 0A 10 0D 10 10 10 13 A0
1331:10 16 0C 02 19 A0 BE 0B 5A
1339:0F 04 09 03 07 0C 18 07 D8
1341:0C 05 0B 01 21 0B 01 09 60
1349:0E 01 1D 0E 01 0A 11 05 92
1351:18 11 05 0F 14 04 14 14 46
1359:04 0B 13 14 04 0F 11 03 69
1361:17 11 03 0A 0E 01 1C 0E 13
1369:01 06 0B 03 20 0B 03 02 58
1371:07 04 24 07 04 0E 04 03 74
1379:18 04 03 0A 11 02 15 02 6A
1381:04 09 13 09 22 09 08 0C 30
1389:1E 0C 0D 0F 19 0F 13 08 87
1391:05 01 19 64 C8 13 01 0B 83
1399:0A 0A 0A 04 0D 09 04 10 6D
13A1:08 04 13 07 04 16 06 04 28
13A9:19 05 04 1C 04 04 00 10 20
13B1:01 0B 11 04 0E 10 04 11 47
13B9:0F 04 14 0E 04 17 0D 04 66
13C1:1A 0C 04 1D 0B 04 20 0A FC
13C9:05 17 14 0A 21 11 06 04 B8
13D1:00 0B 05 24 0A 07 16 14 4A
13D9:04 20 11 03 0A 05 07 10 DE
13E1:04 19 02 23 04 1A 08 11 6C
13E9:0B 05 0E 0B 15 17 11 20 90
13F1:0E 06 08 0F FF 64 05 00 2E
13F9:00 07 00 00 0C 00 00 37 79
1401:00 00 75 00 00 75 00 00 AD
1409:3D 40 00 0C 00 00 04 00 A8
1411:00 15 40 00 10 40 00 40 48
1419:40 00 C0 F0 00 F0 00 00 4C
1421:00 00 00 00 00 00 00 00 49
1429:00 00 00 00 00 00 00 00 51
1431:00 00 00 00 00 00 05 00 63
1439:00 07 00 00 0C 00 00 37 BA
1441:00 00 37 00 00 37 00 00 2D
1449:3D 00 00 0C 00 00 04 00 D8
1451:00 05 00 00 04 00 00 14 EE
1459:00 00 34 00 00 0F 00 00 44
1461:00 00 00 00 00 00 00 00 89
1469:00 00 00 00 00 00 00 00 91
1471:00 00 00 00 00 00 05 00 A3
1479:00 07 00 00 0C 00 00 37 FA
1481:00 00 1F 00 00 1F 40 00 8A
1489:37 00 00 0C 00 00 04 00 16
1491:00 15 40 00 10 40 00 40 C8
1499:40 00 40 F0 00 F0 00 00 BC
14A1:00 00 00 00 00 00 00 00 C9
14A9:00 00 00 00 00 00 00 00 D1
14B1:00 00 00 00 00 00 05 00 E3
14B9:00 0D 00 00 03 00 00 0D 4A
14C1:C0 00 05 D0 00 05 D0 00 AD
14C9:17 C0 00 03 00 00 01 00 DF
14D1:00 15 40 00 10 40 00 10 D8
14D9:10 00 F0 30 00 00 F0 00 0D
14E1:00 00 00 00 00 00 00 00 0A
14E9:00 00 00 00 00 00 00 00 12
14F1:00 00 00 00 00 00 05 00 24
14F9:00 0D 00 00 03 00 00 0D 8A
1501:C0 00 0D C0 00 0D C0 00 EE
1509:07 C0 00 03 00 00 01 00 19
1511:00 05 00 00 01 00 00 01 85
1519:40 00 01 C0 00 0F 00 00 CB
1521:00 00 00 00 00 00 00 00 4B
1529:00 00 00 00 00 00 00 00 53
1531:00 00 00 00 00 00 05 00 65
1539:00 0D 00 00 03 00 00 0D CB
1541:C0 00 0F 40 00 1F 40 00 AE
1549:0D C0 00 03 00 00 01 00 5C
1551:00 15 40 00 10 40 00 10 5A
1559:10 00 F0 10 00 00 F0 00 8C
1561:00 00 00 00 00 00 00 00 8B
1569:00 00 00 00 00 00 00 00 93
1571:00 00 00 00 00 00 14 00 C3
1579:00 15 00 00 3D 00 00 7D 50
1581:00 00 7D 00 00 3C 00 00 4C
1589:3C 00 00 14 00 00 14 00 3B
1591:00 10 00 00 10 00 00 00 40
1599:00 00 00 00 00 00 00 00 C3
15A1:00 00 00 00 00 00 00 00 CB
15A9:00 00 00 00 00 00 00 00 D3
15B1:00 00 00 00 00 00 05 14 00 18
15B9:00 54 00 00 7C 00 00 7D 5A
15C1:00 00 7D 00 00 3C 00 00 8C
15C9:3C 00 00 14 00 00 14 00 7B
15D1:00 04 00 00 04 00 00 00 1D
15D9:00 00 00 00 00 00 00 00 04
15E1:00 00 00 00 00 00 00 00 0C
15E9:00 00 00 00 00 00 00 00 14
15F1:00 00 00 00 00 05 00 00 30
15F9:00 00 00 00 00 00 00 00 24
1601:00 00 00 00 00 00 00 00 2D
1609:00 00 00 00 AA 00 02 AA 39
1611:80 0A AA A0 0A AA A0 2A C5
1619:AA A8 3A AA A4 36 AA B4 BE
1621:27 AA 78 2B 77 68 0A 77 36
1629:A0 0A AA A0 02 AA 80 00 43
1631:AA 00 00 00 00 00 00 00 B2
1639:00 00 00 00 00 00 00 00 65
1641:00 00 00 00 00 00 00 00 6D
1649:00 00 00 00 AA 00 02 AA 79
1651:80 0A AA A0 0A AA A0 0A E5
1659:AA A8 1A AA AC 1E AA 9C C2
1661:2D AA D8 29 DD E8 0A DD 01
1669:A0 0A AA A0 02 AA 80 00 83
1671:AA 00 00 00 00 00 00 00 F2
1679:00 00 00 00 00 00 00 00 A5
1681:00 00 00 00 00 00 00 00 AD
1689:00 14 00 00 96 00 02 AA 1E
1691:80 0A AA A0 0A AA A0 2A 46
1699:AA A8 3A AA A4 36 AA B4 3F
16A1:27 AA 78 2B 77 68 0A 77 B6
16A9:A0 0A AA A0 02 AA 80 00 C3
16B1:AA 00 00 00 00 00 00 00 33
16B9:00 03 00 00 00 D0 00 01 EA
16C1:D0 00 00 00 D0 00 03 10 00 8F
16C9:00 14 00 00 96 00 02 AA 5E
16D1:80 0A AA A0 0A AA A0 2A 86
16D9:AA A8 3A AA A4 36 AA B4 7F
16E1:27 AA 78 2B 77 68 0A 77 F6
16E9:A0 0A AA A0 02 AA 80 00 04
16F1:AA 00 00 00 00 00 00 00 73
16F9:00 00 30 00 00 FC 00 00 20
1701:DC 00 00 DC 00 00 30 00 CB
1709:00 14 00 00 96 00 02 AA 9F
1711:80 0A AA A0 0A AA A0 2A C7
1719:AA A8 3A AA A4 36 AA B4 C0
1721:27 AA 78 2B 77 68 0A 77 38
1729:A0 0A AA A0 02 AA 80 00 45
1731:AA 00 00 00 00 00 00 00 B4
1739:00 00 03 00 00 1C 00 00 38
1741:1D 00 00 1C 00 00 13 00 E5
1749:00 14 00 00 96 00 02 AA DF
1751:80 0A AA A0 0A AA A0 2A 08
1759:AA A8 3A AA A4 36 AA B4 01
1761:27 AA 78 2B 77 68 0A 77 78
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1769:A0 0A AA A0 02 AA 80 00 85
1771:AA 00 00 00 00 00 00 80 75
1779:00 00 80 00 02 A0 00 0A 54
1781:E8 00 2F B2 00 2B BA 00 57
1789:BF BF 80 AF AA 80 BF FF 69
1791:80 2B FA 00 2F BE 00 0A A8
1799:E8 00 02 A0 00 00 00 00 86
17A1:00 00 00 00 00 00 00 00 CF
17A9:00 00 00 00 00 00 00 00 D7
17B1:00 00 00 00 00 00 00 00 DF
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

Bombardment

See instructions in article on page 48 before typing in.

```
C000:20 09 C0 20 CF C0 4C 00 08
C008:C0 A9 00 8D 58 C8 8D 59 87
C010:C8 A9 05 8D 5B C8 A9 05 30
C018:8D 5C C8 A9 00 A2 00 9D 53
C020:00 D4 E8 E0 18 D0 F8 A9 A1
C028:0D 8D B3 C8 A9 06 8D 20 37
C030:D0 8D 21 D0 A9 05 8D 5E 89
C038:C8 8D 5D C8 0A 8D 60 C8 C9
C040:8D 5F C8 A9 04 8D 63 C8 F9
C048:8D 61 C8 8D 62 C8 AD 0E 7A
C050:DC 29 FE 8D 0E DC A5 01 73
C058:29 FB 85 01 A9 00 85 FB 82
C060:A9 D0 85 FC A9 00 85 FD C1
C068:A9 30 85 FE A0 00 B1 FB CF
C070:91 FD A5 FB 18 69 01 85 9C
C078:FB A5 FC 69 00 85 FC A5 4D
C080:FD 18 69 01 85 FD A5 FE B2
C088:69 00 85 FE C9 38 D0 DC 0D
C090:A5 FD C9 00 D0 D6 A5 01 CB
C098:09 04 85 01 AD 0E DC 09 C8
C0A0:01 8D 0E DC AD 18 D0 29 2E
C0A8:F0 18 69 0C 8D 18 D0 A2 A7
C0B0:00 BD B6 C8 9D 18 33 E8 A1
C0B8:E0 5A D0 F5 A2 00 BD B6 02
C0C0:C8 9D 10 33 E8 E0 08 D0 EE
C0C8:F5 A9 04 8D 5A C8 60 20 DF
C0D0:30 C1 20 A8 C2 A0 00 AD AF
C0D8:5C C8 F0 0A AD 5B C8 D0 B6
C0E0:EE A2 05 4C E8 C0 A2 00 77
C0E8:BD 7D C8 99 88 C8 C8 E8 3D
C0F0:C0 05 D0 F4 A0 00 A9 91 67
C0F8:20 D2 FF A9 0D 20 D2 FF 68
C100:A9 9F 20 D2 FF A2 00 BD B9
C108:88 C8 CD 87 C8 D0 02 A9 6B
C110:20 29 7F 20 D2 FF E8 E0 29
C118:27 D0 EC A9 00 85 C6 A5 E4
C120:C6 F0 FC 20 E4 FF C9 59 F8
C128:F0 05 C9 4E D0 ED 00 60 22
C130:A9 93 20 D2 FF A9 96 20 92
C138:D2 FF A9 14 8D 79 C8 A9 29
C140:02 8D 7A C8 A9 05 8D 7B FB
C148:C8 20 72 C2 A9 07 8D 79 B0
C150:C8 A9 08 8D 7A C8 A9 0B D1
C158:8D 7B C8 20 72 C2 A9 22 B0
C160:8D 79 C8 A9 08 8D 7A C8 F0
C168:A9 0B 8D 7B C8 20 72 C2 5B
C170:A9 14 8D 79 C8 A9 13 8D B7
C178:7A C8 A9 05 8D 7B C8 20 FC
C180:72 C2 A9 13 20 D2 FF A9 4A
C188:27 8D 64 C8 A9 A3 20 D2 0B
C190:FF CE 64 C8 D0 F6 A9 16 AC
C198:8D 64 C8 A9 A2 20 D2 FF EA
C1A0:20 D2 FF A9 11 20 D2 FF 32
C1A8:A9 9D 20 D2 FF 20 D2 FF BF
C1B0:CE 64 C8 D0 E6 A9 29 8D 98
C1B8:64 C8 A9 A3 20 D2 FF CE 2B
C1C0:64 C8 D0 F6 A9 20 A2 07 4C
C1C8:20 D2 FF CA D0 FA A9 90 14
C1D0:20 D2 FF A2 00 BD 7D C8 FD
C1D8:29 7F 20 D2 FF E8 E0 05 6C
C1E0:D0 F3 A9 20 20 D2 FF AD FA
C1E8:5B C8 18 69 30 20 D2 FF 8D
C1F0:A2 0B A9 20 20 D2 FF CA D6
C1F8:D0 F8 A9 05 20 D2 FF A2 97
C200:05 BD 7D C8 29 7F 20 D2 0E
C208:FF E8 E0 0A D0 F3 A9 20 4E
C210:20 D2 FF AD 5C C8 18 69 D4
C218:30 20 D2 FF A0 00 A9 E9 5A
C220:8D AF C8 85 FB A9 05 8D E7
C228:B0 C8 85 FC A9 69 91 FB CA
C230:A9 E9 85 FB A9 D9 85 FC 32
C238:A9 00 91 FB A9 FE 8D B1 9A
C240:C8 85 FB A9 05 8D B2 C8 32
C248:85 FC A9 6D 91 FB A9 FE AA
C250:85 FB A9 D9 85 FC A9 01 DE
C258:91 FB A9 00 8D 58 C8 8D C7
C260:77 C8 A9 00 8D 6A C8 A9 5A
C268:04 8D 6B C8 A9 00 8D 6C 22
C270:C8 60 A9 13 20 D2 FF AE D3
C278:79 C8 CA F0 08 A9 1D 20 96
C280:D2 FF 4C 7A C2 AE 7A C8 2F
C288:CA F0 08 A9 11 20 D2 FF F9
C290:4C 88 C2 A9 A2 20 D2 FF 8C
C298:A9 11 20 D2 FF A9 9D 20 6A
C2A0:D2 FF CE 7B C8 D0 EC 60 E4
C2A8:CE 61 C8 D0 09 AD 63 C8 A2
C2B0:8D 61 C8 20 FC C2 CE 62 63
C2B8:C8 D0 09 AD 63 C8 8D 62 8E
C2C0:C8 20 26 C3 AD 58 C8 F0 05
C2C8:03 4C DA C2 20 50 C3 20 54
C2D0:26 C8 20 4B C8 AD 58 C8 CA
C2D8:F0 CE 20 8F C7 A9 1E 85 2E
C2E0:FB 20 4B C8 C6 FC D0 F9 28
C2E8:20 8F C7 20 4B C8 20 B6 D1
C2F0:C7 20 4B C8 20 8F C7 C6 ED
C2F8:FB D0 E6 60 AD 00 DC 8D 48
C300:65 C8 AD AF C8 8D 66 C8 2F
C308:AD B0 C8 8D 67 C8 A9 00 36
C310:8D 70 C8 8D 71 C8 20 69 C4
C318:C4 AD 66 C8 8D AF C8 AD 31
C320:67 C8 8D B0 C8 60 AD 01 6E
C328:DC 8D 65 C8 AD B1 C8 8D 0E
C330:66 C8 AD B2 C8 8D 67 C8 12
C338:A9 01 8D 70 C8 8D 71 C8 B5
C340:20 69 C4 AD 66 C8 8D B1 C8
C348:C8 AD 67 C8 8D B2 C8 60 42
C350:A9 00 8D 76 C8 A9 FF 8D 40
C358:6D C8 A0 00 AD B3 C8 8D 38
C360:70 C8 AD 6A C8 85 FB 18 1B
C368:69 D0 85 FD AD 6B C8 85 9B
C370:FC 69 07 85 FE B1 FB C9 8A
C378:64 F0 07 C9 65 F0 03 4C 2D
C380:2B C4 B1 FD 8D 6E C8 AD 4A
C388:6C C8 F0 07 B1 FD 29 DF BE
C390:4C 97 C3 B1 FD 09 20 91 9D
C398:FD 8D 6F C8 AD 6E C8 4A FF
C3A0:4A 4A 4A 4A CD 6C C8 D0 50
C3A8:0B B1 FD 29 10 D0 08 AD F5
C3B0:6C C8 D0 03 4C 2B C4 B1 35
C3B8:FD 29 0F 8D 73 C8 20 46 89
C3C0:C6 C9 00 D0 19 AD 68 C8 44
C3C8:18 69 D0 85 FD AD 69 C8 6B
C3D0:69 07 85 FE A0 00 AD 6F 3F
C3D8:C8 91 FD 4C 2B C4 C9 03 B0
C3E0:F0 1D C9 04 F0 27 C9 01 5A
C3E8:F0 06 CE 5C C8 4C F3 C3 2D
C3F0:CE 5B C8 A9 01 8D 58 C8 22
C3F8:A0 00 A9 6E 91 FD 60 A9 DB
C400:0F 8D 7C C8 20 B6 C7 20 1C
C408:8E C5 4C 2B C4 A9 00 8D E0
C410:B4 C8 A9 11 8D 7C C8 20 7C
C418:B6 C7 20 8E C5 A5 FD 85 22
C420:FB A5 FE 85 FC 20 8E C5 94
C428:4C 2B C4 CE 6D C8 D0 01 59
C430:60 AD 6A C8 18 69 01 8D 25
C438:6A C8 AD 6B C8 69 00 8D 0F
C440:6B C8 C9 07 D0 20 AD 6A 28
C448:C8 C9 E8 D0 19 A9 00 8D CF
C450:6A C8 A9 04 8D 6B C8 EE 51
C458:6C C8 AD 6C C8 C9 02 D0 09
C460:05 A9 00 8D 6C C8 4C 5A 29
C468:C3 AD 66 C8 85 FB AD 67 77
C470:C8 85 FC A0 00 B1 FB 38 60
C478:E9 65 8D 73 C8 A9 00 8D B3
C480:75 C8 AD 65 C8 29 05 D0 C8
C488:05 A9 01 4C E2 C4 AD 65 CE
C490:C8 29 09 D0 05 A9 03 4C 18
C498:E2 C4 AD 65 C8 29 0A D0 A0
C4A0:05 A9 05 4C E2 C4 AD 65 67
C4A8:C8 29 06 D0 05 A9 07 4C D7
C4B0:E2 C4 AD 65 C8 29 01 D0 A6
C4B8:05 A9 02 4C E2 C4 AD 65 1F
C4C0:C8 29 08 D0 05 A9 04 4C 2A
C4C8:E2 C4 AD 65 C8 29 02 D0 C0
C4D0:05 A9 06 4C E2 C4 AD 65 B7
C4D8:C8 29 04 D0 5A A9 08 4C 74
C4E0:E2 C4 8D 73 C8 A9 00 8D 70
C4E8:75 C8 20 46 C6 C9 00 D0 F5
C4F0:1D AD 74 C8 8D 75 C8 A5 09
C4F8:FB 8D 66 C8 A5 FC 8D 67 E0
C500:C8 A0 00 A9 65 18 6D 73 8C
C508:C8 91 FB 4C 37 C5 C9 04 09
C510:D0 25 A9 01 8D 58 C8 A5 97
C518:FB 18 69 00 85 FD A5 FC 41
C520:69 D4 85 FE A0 00 A9 6E FC
C528:91 FD AD 70 C8 F0 04 CE 99
C530:5C C8 60 CE 5B C8 60 AD 81
C538:65 C8 29 10 F0 01 60 AD C8
C540:B3 C8 8D 70 C8 A9 01 8D 0D
C548:76 C8 20 46 C6 C9 00 F0 F7
C550:01 60 AD 68 C8 18 69 D0 FA
C558:85 FD AD 69 C8 69 07 85 F1
C560:FE A0 00 AD 71 C8 D0 08 C6
C568:A9 0A 8D 61 C8 4C 75 C5 3B
C570:A9 0A 8D 62 C8 AD 75 C8 DB
C578:F0 02 A9 10 0D 73 C8 91 8C
C580:FD AD 71 C8 F0 04 20 02 0B
C588:C8 60 20 DE C7 60 A5 FB 89
C590:18 69 D0 85 FB A5 FC 69 CE
C598:07 85 FC AD B4 C8 D0 14 02
C5A0:EE 72 C8 EE 72 C8 AD 72 CC
C5A8:C8 29 07 18 69 01 8D 72 22
C5B0:C8 4C BA C5 A0 00 B1 FB CB
C5B8:29 0F C9 01 F0 1B C9 02 6F
C5C0:F0 2A C9 03 F0 2B C9 04 84
C5C8:F0 3A C9 05 F0 3B C9 06 F2
C5D0:F0 4A C9 07 F0 4B 4C 34 92
C5D8:C6 AD B4 C8 F0 09 C9 63 F8
C5E0:F0 05 A9 03 4C 39 C6 A9 0A
C5E8:07 4C 39 C6 A9 06 4C 39 D5
C5F0:C6 AD B4 C8 F0 09 C9 63 11
C5F8:F0 05 A9 01 4C 39 C6 A9 02
C600:05 4C 39 C6 A9 08 4C 39 F5
C608:C6 AD B4 C8 F0 09 C9 63 2A
C610:F0 05 A9 07 4C 39 C6 A9 7B
C618:03 4C 39 C6 A9 02 4C 39 F4
C620:C6 AD B4 C8 F0 09 C9 63 42
C628:F0 05 A9 05 4C 39 C6 A9 73
C630:01 4C 39 C6 A9 04 4C 39 14
C638:C6 8D 6E C8 B1 FB 29 F0 A7
C640:0D 6E C8 91 FB 60 A9 00 D6
C648:8D 74 C8 AD 73 C8 C9 01 01
C650:F0 1B C9 02 F0 1F C9 03 11
C658:F0 23 C9 04 F0 27 C9 05 5D
C660:F0 2B C9 06 F0 2F C9 07 A9
C668:F0 33 4C A5 C6 A9 29 20 6E
C670:7D C7 4C AD C6 A9 28 20 60
C678:7D C7 4C AD C6 A9 27 20 66
C680:7D C7 4C AD C6 A9 01 20 22
C688:6B C7 4C AD C6 A9 29 20 71
C690:6B C7 4C AD C6 A9 28 20 77
C698:6B C7 4C AD C6 A9 27 20 7D
C6A0:6B C7 4C AD C6 A9 01 20 39
C6A8:7D C7 4C AD C6 A0 00 B1 B5
C6B0:FD C9 20 F0 19 C9 62 F0 68
C6B8:0F C9 63 F0 0B C9 64 F0 F4
C6C0:0A C9 65 F0 06 4C 46 C7 37
C6C8:4C 3D C7 4C 43 C7 A0 00 04
C6D0:AD 70 C8 C9 00 F0 07 C9 A2
C6D8:01 F0 03 4C EE C6 B1 FB 3A
C6E0:38 E9 65 CD 73 C8 F0 2B 5A
C6E8:A9 00 8D 74 C8 60 A9 01 60
C6F0:8D 74 C8 AD 70 C8 CD B3 4C
C6F8:C8 D0 18 A9 64 91 FD A5 C7
C700:FD 8D 68 C8 A5 FE 8D 69 39
C708:C8 AD 76 C8 C9 01 D0 07 BD
C710:4C 23 C7 B1 FB 91 FD A9 6E
C718:20 91 FB A5 FD 85 FB A5 99
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C720:FE 85 FC A5 FD 18 69 00 AD
C728:85 FD A5 FE 69 D4 85 FE 47
C730:AD 70 C8 91 FD A9 01 8D 0B
C738:74 C8 A9 00 60 8D B4 C8 D4
C740:A9 03 60 A9 04 60 AD 70 79
C748:C8 CD B3 C8 F0 03 A9 03 9C
C750:60 A5 FD 18 69 00 85 FD 0F
C758:A5 FE 69 D4 85 FE A0 00 5E
C760:B1 FD 29 01 8D 78 C8 18 75
C768:69 01 60 8D 64 C8 A5 FB 5F
C770:18 6D 64 C8 85 FD A5 FC EC
C778:69 00 85 FE 60 8D 64 C8 28
C780:A5 FB 38 ED 64 C8 85 FD 17
C788:A5 FC E9 00 85 FE 60 A9 F9
C790:00 8D 12 D4 A9 29 8D 13 33
C798:D4 A9 02 8D 14 D4 AD 0E 73
C7A0:D4 69 14 8D 0E D4 A9 13 7A
C7A8:8D 0F D4 A9 0F 8D 18 D4 AB
C7B0:A9 81 8D 12 D4 60 A9 00 C3
C7B8:8D 12 D4 A9 25 8D 13 D4 23
C7C0:A9 02 8D 14 D4 AD 0E D4 E6
C7C8:69 4B 8D 0E D4 AD 7C C8 91
C7D0:8D 0F D4 A9 0F 8D 18 D4 D3
C7D8:A9 11 8D 12 D4 60 A9 00 CF
C7E0:8D 04 D4 A9 76 8D 05 D4 36
C7E8:A9 0F 8D 06 D4 A9 0E 8D 1A
C7F0:00 D4 A9 0B 8D 01 D4 A9 5F
C7F8:0F 8D 18 D4 A9 81 8D 04 36
C800:D4 60 A9 00 8D 0B D4 A9 35
C808:76 8D 0C D4 A9 0F 8D 0D B8
C810:D4 A9 0E 8D 07 D4 A9 0D FC
C818:8D 08 D4 A9 0F 8D 18 D4 5B
C820:A9 81 8D 0B D4 60 CE 5D 6C
C828:C8 F0 01 60 AD 5E C8 8D 86
C830:5D C8 AD 23 33 29 04 F0 C1
C838:09 A9 18 8D 23 33 8D 24 B9
C840:33 60 A9 1C 8D 23 33 8D 67
C848:24 33 60 AE 5A C8 AC 5A 59
C850:C8 88 D0 FD CA D0 F7 60 4C
C858:00 00 00 00 00 00 00 00 E9
C860:00 00 00 00 00 00 00 00 F1
C868:00 00 00 00 00 00 00 00 F9
C870:00 00 00 00 00 00 00 00 02
C878:00 00 00 00 00 C2 CC C1 70
C880:C3 CB D7 C8 C9 D4 C5 BA 56
C888:BF BF BF BF BF BA D0 CC 35
C890:C1 D9 C5 D2 BA D7 CF CE 03
C898:A1 BA BA BA BA BA D0 CC DB
C8A0:C1 D9 BA C1 C7 C1 C9 CE A4
C8A8:BA A8 D9 AD CE A9 BF 00 74
C8B0:00 00 00 00 00 00 FF C3 06
C8B8:A5 99 99 A5 C3 FF 00 00 2F
C8C0:00 18 18 00 00 00 00 00 5B
C8C8:08 38 1C 10 00 00 80 98 8A
C8D0:58 3C 1A 28 44 22 42 5A EC
C8D8:5A 3C 18 18 24 24 01 19 F7
C8E0:1A 3C 58 14 22 44 00 18 15
C8E8:18 3F 58 18 24 48 00 18 3D
C8F0:18 3C 5A 19 24 48 00 18 D4
C8F8:18 3C 5A 3C 18 3C 00 18 7E
C900:18 3C 5A 98 24 12 00 18 05
C908:18 FC 1A 28 24 12 00 00 16
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Disc Blitz

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HE 10 REM COPYRIGHT 1988 COMPU
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ER 20 AD=49152:IFPEEK(AD+5)=94
      THEN120
EG 30 POKE53280,0:POKE53281,0
GS 40 PRINT"{CLR}{DOWN}PLEASE
      {SPACE}WAIT (1 MINUTE)..
      ."
FA 50 FORQ=0TO31:READA:NEXT:FO
      RX=1TO30:READQ$
RC 60 FORT=1TOLEN(Q$)-4STEP2:A
      $=MID$(Q$,T,1)
KJ 70 GOSUB110:W=V*16:A$=MID$(
      Q$,T+1,1):GOSUB110:W=W+V
      :POKEAD,W:AD=AD+1:CH=CH+
      W
JR 80 W=0:NEXT
BG 90 IFCH<>VAL(RIGHT$(Q$,4))T
      HENPRINT"ERROR IN LINE"P
      EEK(63)+PEEK(64)*256:END
DS 100 CH=0:W=0:NEXTX:GOTO120
PC 110 V=ASC(A$)-48+7*(A$>"9")
       :RETURN
KQ 120 A2=50090:POKE50015,0:GO
       TO220
EE 130 S=54272:FORX=54272TO542
       96:POKEX,0:NEXTX:POKES+
       24,15
SB 140 POKES+4,0:POKES+5,0:POK
       ES+6,240:POKES+4,17
ED 150 RESTORE:FORX=0TO15
QK 160 READA,B:GETA$:J=PEEK(56
       320):IFA$<>""ORJ=111THE
       NPOKES+4,0:GOTO550
RP 170 POKES+1,A:POKES,B:FORY=
       1TO100:NEXTY,X:GOTO150
CA 180 DATA 11,48,14,24,18,209
       ,11,48
MJ 190 DATA 10,143,14,24,18,20
       9,10,143
PJ 200 DATA 9,104,14,24,18,209
       ,14,24
HK 210 DATA 9,104,14,24,18,209
       ,14,24
FC 220 PRINT"{BLK}{CLR}"CHR$(8
       )
DS 230 LEVEL=1
BM 240 POKE49557,6:REM SPEED
GF 250 SYS49152
PF 260 ADD=49853
BE 270 POKE53280,0:POKE53281,0
PK 280 SHIP=3
EF 290 A=PEEK(53248+30)
CA 300 V=53248
MK 310 FORX=12288+26*8+2TO1228
       8+26*8+7:POKEX,252:NEXT
       X:POKE12288+26*8,0
QP 320 POKE12288+26*8+1,0
EH 330 POKEV+39,7
EM 340 POKEV+21,0
EE 350 ROUT=1
AD 360 PRINTSPC(9)"{2 DOWN}{4}
       {4 SPACES}{2 RIGHT}
       {3 SPACES}{5} {2 RIGHT}
       {4}{3 SPACES}{5}
       {2 RIGHT}{4}{3 SPACES}"
       SPC(19);
AA 370 PRINT"{2 SPACES}{RIGHT}
       {2 SPACES}{2 RIGHT}
       {2 SPACES}{2 RIGHT}
       {2 SPACES}{4 RIGHT}
       {2 SPACES}{RIGHT}{5}
       {2 SPACES}{4 RIGHT}";
PQ 380 PRINTSPC(14)"{4}
       {2 SPACES}{2 RIGHT}{5}
       {SPACE}{2 RIGHT}{4} {5}
        {2 RIGHT}{4}{3 SPACES}
       {5} {2 RIGHT}{4} {5} "S
       PC(21);
ER 390 PRINT"{4}{2 SPACES}
       {2 RIGHT}{8} {2 RIGHT}
       {5} {4} {4 RIGHT}{5}
       {8}{2 SPACES}{RIGHT}{5}
        {8} "SPC(21)"{4} {5}
       {RIGHT}{8} {5} {RIGHT}"
       ;
KS 400 PRINT"{RIGHT}{8}
       {2 SPACES}{4 RIGHT}
       {2 SPACES}{5} {RIGHT}
       {8}{2 SPACES}{RIGHT}
       {5} ";
MJ 410 PRINTSPC(18)"{8}
       {3 SPACES}{5} {2 RIGHT}
       {8}{3 SPACES}{5}
       {RIGHT}{8}{3 SPACES}{5}
        {3 RIGHT}{8}{2 SPACES}
       {5} {DOWN}"
PH 420 PRINTSPC(7)"{4}
       {4 SPACES}{4 RIGHT}
       {2 SPACES}{4 RIGHT}
       {2 SPACES}{RIGHT}
       {7 SPACES}{RIGHT}
       {6 SPACES}";
QC 430 PRINTSPC(8)"{2 SPACES}
       {2 RIGHT} {5} {2 RIGHT}
       {4}{2 SPACES}{4 RIGHT}
       {2 SPACES}{4 RIGHT}
       {2 SPACES}";
PF 440 PRINTSPC(7)" {5}
       {2 SPACES}{7 RIGHT}{4}
       {3 SPACES}{RIGHT}{5}
       {2 SPACES}{2 RIGHT}{4}
       {SPACE}{5} {RIGHT}";
CK 450 PRINT"{3 RIGHT}{4} {5}
       {SPACE}{4 RIGHT}{4} {5}
        {6 RIGHT}{4} {5}
       {2 SPACES}";
MP 460 PRINTSPC(8)"{4} {5}
       {RIGHT}{2 SPACES}
       {3 RIGHT}{2 SPACES}
       {4 RIGHT}{2 SPACES}
       {4 RIGHT}{2 SPACES}";
BD 470 PRINT"{5 RIGHT}
       {3 SPACES}"SPC(9)"
       {2 SPACES}{2 RIGHT}{8}
       {SPACE}{5} {2 RIGHT}";
DD 480 PRINT"{8}{2 SPACES}
       {4 RIGHT} {5} {4 RIGHT}
       {8} {5} {4 RIGHT}{5}
       {2 SPACES}{8} ";
AH 490 PRINTSPC(10)"{5 SPACES}
       {5} {2 RIGHT}{8}
       {4 SPACES}{5} {RIGHT}
       {8} {5} {3 RIGHT}";
GF 500 PRINT"{RIGHT}{8} {5}
       {4 RIGHT}{8}{6 SPACES}
       {5} {6 RIGHT}{2 DOWN}"
SS 510 PRINTSPC(12)"{3 DOWN}
       {OFF}{YEL}{3 UP}COPYRIG
       HT{RIGHT}1988"
XF 520 PRINTSPC(7)"COMPUTE!
       {RIGHT}PUBLICATIONS,
       {RIGHT}INC."
PH 530 PRINTSPC(10)"ALL{RIGHT}
       RIGHTS{RIGHT}RESERVED"
PE 540 GOTO130
XK 550 PRINT"{7}{CLR}{3 DOWN}
       {8 LEFT}";
RS 560 PRINT"{8}O{5 Y}P
       {7 LEFT}{DOWN}";
HK 570 FORY=1TO21
DQ 580 PRINT"{8}{H}
       {5 SHIFT-SPACE}{N}
       {7 LEFT}{DOWN}";:NEXTY
EF 590 PRINT"{UP}L{5 P}@"
MP 600 PRINT"{HOME}{4 DOWN}
       {7 LEFT}{5}SCORE"
FQ 610 PRINT"{HOME}{6 DOWN}
       {7 LEFT}00000"
PE 620 PRINT"{HOME}{8 DOWN}
       {7 LEFT}SHIPS"
MJ 630 PRINT"{HOME}{10 DOWN}
       {3 LEFT}3"
FS 640 PRINT"{HOME}{12 DOWN}
       {7 LEFT}LEVEL"
FB 650 PRINT"{HOME}{14 DOWN}
       {3 LEFT}1"
HX 660 POKE50015,1
PM 670 ON ROUTINE GOSUB920,940
       ,960,980
SP 680 ON LEVEL GOSUB730,740,7
       50,760,770
PG 690 POKEV+21,253:SYS49423
EA 700 IFPEEK(2)=1THEN780
PF 710 IFPEEK(2)=2THEN1000
FC 720 END
BR 730 FORX=ADDTOADD+11:POKEX,
       1:NEXT:RETURN:REM LEVEL
       1
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FE 740 FORX=ADDTOADD+11STEP2:POKEX,1:POKEX+1,0:NEXT:RETURN:REM LEVEL2
DX 750 FORX=ADDTOADD+11STEP2:POKEX,0:POKEX+1,1:NEXT:RETURN:REM LEVEL3
MH 760 FORX=ADDTOADD+11:POKEX,0:NEXT:RETURN:REM LEVEL4
FQ 770 FORX=ADDTOADD+11:POKEX,RND(0)*2:NEXT:RETURN:REM LEVEL5
FS 780 REM SHIP CONTROL
EF 790 POKEV+21,1:POKES+4,0
HH 800 FORX=1TO50:POKE832+RND(0)*64,0:NEXTX
FH 810 SHIP=SHIP-1
JR 820 IFSHIP=-1THEN890
CQ 830 PRINT"{HOME}{10 DOWN}{7 LEFT}{5}{3 RIGHT}"SHIP:POKE1024+36+40*9,96
BA 840 POKEV,0:POKEV+1,100
MR 850 SYSA2
SC 860 FORX=0TO26:POKEV,X:FORY1=1TO50:NEXTY1,X
DX 870 GOTO670
QE 880 PRINT"{HOME}{16 DOWN}{7 LEFT}{5}{4 RIGHT}PRESS{DOWN}{3 LEFT}ANY{DOWN}{3 LEFT}KEY"
SG 890 POKEV+21,0:PRINT"{HOME}{18 DOWN}{7 LEFT}{WHT}PRESS{DOWN}{4 LEFT}ANY{DOWN}{3 LEFT}KEY"
XK 900 GETDH$:IFDH$=""THENGOTO890
PP 910 GOTO120
JA 920 REM ROUTINE1
HS 930 A=70:FORX=V+4TOV+14STEP+2:POKEX,A:POKEX+1,A:A=A+30:NEXTX:RETURN
SG 940 REM ROUTINE2
AB 950 A=70:FORX=V+4TOV+14STEP2:POKEX,240:POKEX+1,A:A=A+30:NEXT:RETURN
EF 960 REM ROUTINE3
GX 970 A=70:FORX=V+4TOV+14STEP2:POKEX,100:POKEX+1,A:A=A+30:NEXT:RETURN
MP 980 REM ROUTINE4
JE 990 A=70:FORX=V+4TOV+14STEP2:POKEX,A:POKEX+1,200:A=A+30:NEXT:RETURN
XQ 1000 REM SET UP NEW BALLS
MB 1010 ROUT=ROUT+1:IFROUTINE>4THENROUTINE=1:LEVEL=LEVEL+1:IFLEVEL>5THENLEVEL=5
DX 1020 PRINT"{HOME}{14 DOWN}{7 LEFT}{5}{3 RIGHT}"LEVEL:POKE1024+36+40*13,96
KB 1030 GOTO670
CB 1040 DATAA201A9008D5EC38D5DC38E0EC38E0FC3AD0EDC29FE8D0EDCA50129FB8501A0003723
JS 1050 DATA84FB84FDA9D085FCA93085FEB1FB91FDE6FBE6FDD0F6E6FCE6FEA5FEC938D0EC6464
HQ 1060 DATAA50109048501AD0EDC09018D0EDCA91D8D18D0A0FF8C0031888C01318C0631A92970
AX 1070 DATAFA8D02318D03318D0431A9C28D0531A9008D0731A9FF8D1CD04CFDC0300000003123
RK 1080 DATA0000000000000000000000003F00003AFFC0EABFC0FFEC00EAAB003AAEF0EABFAC3150
KG 1090 DATAFFFFFFEABFAC3AAEF0EAAB00FFEC00EABFC03AFFC03F0000000000000000003C3975
DG 1100 DATA0003D7C00D55700D557035555C35555CD55557D55557D55557D55557D55557D53428
AX 1110 DATA5557D55557D55557D5555735555C35555C0D55700D557003D7C0003C00A90F8D3002
GB 1120 DATA05D478A9C98D1403A9C28D15035860AD1ED0A0FF8C18D48C15D0C8B97FC099404075
JP 1130 DATA03A900998003A9008D20D08D21D0B9BEC099C003C8C040D0E2A01A8C00D0A0643987
MP 1140 DATA8C01D0A20D8EF807E88EF907E88AA00699F90788D0FAA9AA8D8C038D8F038DB04317
XA 1150 DATA038DB303AD1ED0ADFE02C900F00160AD00DC2902D003EE01D0AD00DC2901D0033444
JH 1160 DATACE01D0AD01D0C932D003EE01D0C9E5D003CE01D0A20A20B3EECAD0FAAD1ED08D4595
JK 1170 DATA07C32901F005A901850260AD15D029FCD005A902850260AD00DC2910D018AD153076
QB 1180 DATAD009028D15D0AD02D0D00BA92E8D02D0AD01D08D03D0AD02D0F027EE02D0EE023841
MB 1190 DATAD0EE02D0EE28D0AD02D08D01D4A9008D00D48D05D4A9F08D06D4A9818D04D44C4258
KX 1200 DATA12C2AD15D029FD8D15D0A9008D04D48D02D0A200BDBDC2D006DE04D04C22C2FE4095
GR 1210 DATA04D0BDBEC2D006DE05D04C30C2FE05D0BD04D0C9FFD003DEBDC2C919D003FEBD4772
KF 1220 DATAC2BD05D0C9E5D003DEBEC2C932D003FEBEC2E8E8E00CD0BCAD07C32902F05BAD4961
AR 1230 DATA15D08DFFCFA9048DFECFA9030DFECF8D15D0ADFECF2DFFCFF015AEC002E8E88E4999
DG 1240 DATA00CEADC002CD00CED0F8AD1ED0D00CADFECF0A8DFECFD0D24CB4C220E9C2A9004813
AA 1250 DATA8D02D0AD15D029FD8D15D0ADFECF4DFFCF8DFFCFADFFCF8D15D04C67C1010101014573
DQ 1260 DATA0101010101010101012060C32010C3A2001E00319008BD00310901 9D0031E8E01878
JH 1270 DATA07D0EEEEC0024C31EAA00018A207FEE604BDE604C93AD009A9309DE604CA4CEE4108
SQ 1280 DATAC2C8C00AD0E56030010F0C0B0C0F0101AE0FC3E88E0FC3E005D008A2008E0FC33172
EG 1290 DATA4C26C34C3CC3AE0EC3E88E0EC3E006D005A2008E0EC3BD08C38D25D0600547073519
KS 1300 DATAE90BDA0C8F08610C8F0C8F08610968 0E180C8F0968 0808610C8F0C8F08610000002076
XJ 1310 DATAAD5FC3F044EE5EC3AD5EC3C919D03AA9008D5EC3A9008D0BD4A9008D0DD4A9094097
BP 1320 DATA8D0CD4EE5DC3EE5DC3AD5DC3C920D005A9008D5DC3AE5DC3BD3DC3BC3EC38D084423
BX 1330 DATAD48C07D4A9218D0BD460A000B97FC0994003C8C03FD0F560FF3376
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

Smooth Scrolling Windows

See instructions in article on page 54 before typing in.

Program 1: ML-SCROLL

```
CC00:4C 09 CC 4C D7 CD 4C D7 C6
CC08:CE A9 08 20 D2 FF A9 A0 01
CC10:85 FC A9 00 A8 85 FB A9 DD
CC18:20 91 FB C8 D0 F9 E6 FC 6B
CC20:A5 FC C9 C0 90 F1 AD 88 41
CC28:02 C9 C8 F0 36 A9 C8 8D D4
CC30:88 02 A9 93 20 D2 FF A9 F2
CC38:00 8D 00 DD A9 20 8D 18 14
CC40:D0 20 87 CC A9 D0 85 FC A0
CC48:A9 00 A8 85 FD 85 FB A9 CB
CC50:C0 85 FE A2 08 B1 FB 91 46
CC58:FD C8 D0 F9 E6 FC E6 FE D4
CC60:CA D0 F2 20 64 CF A0 00 97
CC68:A9 00 91 FD C8 D0 F9 E6 4D
CC70:FE A5 FE C9 C8 D0 F1 20 FC
CC78:7D CC 4C 94 CC 48 A5 01 AA
CC80:09 07 85 01 58 68 60 78 BE
CC88:A5 01 29 FA 85 01 60 A2 9D
CC90:0E 6C 00 03 A9 A0 8D 16 7D
CC98:CD A9 00 8D 15 CD 20 CD 4A
CCA0:CD C0 19 B0 EA 8C BB 02 82
CCA8:20 CD CD C0 28 B0 E0 8C DD
CCB0:B8 02 20 CD CD 98 18 6D 76
CCB8:BB 02 C9 1A B0 D1 8C A8 1A
CCC0:02 20 CD CD 98 18 6D B8 B2
CCC8:02 C9 29 B0 C2 8C A7 02 9F
CCD0:20 CD CD B0 BA 8C AF 02 1C
CCD8:20 73 00 20 8B B0 A9 00 D3
CCE0:8D B9 02 8D B5 02 A0 00 BF
CCE8:B1 47 85 02 C8 B1 47 85 1F
CCF0:FB C8 B1 47 85 FC A0 00 C6
CCF8:8C B6 02 B1 FB C9 5F F0 98
CD00:5A A5 02 D0 03 EE B6 02 C2
CD08:B1 FB 20 22 CF AE B6 02 4A
CD10:F0 02 A9 20 8D 00 A0 C6 50
CD18:02 D0 03 EE B6 02 C8 CC 54
CD20:A7 02 B0 11 AD 15 CD 18 AC
CD28:69 80 8D 15 CD 90 03 EE 41
CD30:16 CD 4C 08 CD A5 47 18 FF
CD38:69 03 85 47 90 02 E6 48 11
CD40:EE B5 02 AD B5 02 C9 80 A5
CD48:B0 11 EE B9 02 A9 A0 8D 7F
CD50:16 CD AD B9 02 8D 15 CD F9
CD58:4C E6 CC AE BB 02 AC B8 50
CD60:02 18 20 F0 FF A5 D2 85 D7
```

```
CD68:FE A5 D1 18 65 D3 85 FD 2C
CD70:90 02 E6 FE A0 00 8C AB 6B
CD78:02 8C B6 02 A5 FD 8D A9 19
CD80:02 A5 FE 8D AA 02 AE A7 A1
CD88:02 8E AE 02 A2 7F E8 8A 2E
CD90:C9 00 D0 03 4C 8F CC 91 27
CD98:FD 98 18 69 28 A8 90 02 F9
CDA0:E6 FE EE AB 02 AD AB 02 28
CDA8:CD A8 02 90 E1 EE B6 02 D8
CDB0:AD AA 02 85 FE AD A9 02 6A
CDB8:18 6D B6 02 85 FD 90 02 F9
CDC0:E6 FE A0 00 8C AB 02 CE 89
CDC8:AE 02 D0 C2 60 20 73 00 EC
CDD0:20 9E AD 20 F7 B7 60 A9 E4
CDD8:A0 85 FC A9 00 85 FB AD 1C
CDE0:A7 02 8D B6 02 20 64 CF 17
CDE8:AD A8 02 8D AE 02 A9 00 6F
CDF0:8D AC 02 8D AD 02 20 38 85
CDF8:CF A5 FD 18 69 08 85 FD 9B
CE00:90 02 E6 FE CE AE 02 D0 39
CE08:F0 20 87 CC A5 FB 20 7D BE
CE10:CC 18 69 80 85 FB 90 02 8E
CE18:E6 FC CE B6 02 D0 C9 A9 3E
CE20:00 8D AC 02 A9 01 AD A8 2C
CE28:02 8D AB 02 A9 A0 85 FC 97
CE30:AD AB 02 85 FB A9 00 8D 3C
CE38:AD 02 AD A7 02 8D B6 02 13
CE40:A9 00 85 FD A9 04 85 FE AA
CE48:20 38 CF A9 00 8D AC 02 2A
CE50:A5 FB 18 69 80 85 FB 90 FB
CE58:02 E6 FC AD AD 02 D0 02 44
CE60:E6 FE CE B6 02 D0 E1 AD 3B
CE68:A8 02 0A 0A 0A 8D B3 02 AC
CE70:A9 00 8D B4 02 20 94 CF 69
CE78:AD A7 02 8D BA 02 20 64 72
CE80:CF A9 01 8D AD 02 AC AD E5
CE88:02 B1 FD 88 91 FD C8 C8 BA
CE90:CC B3 02 90 F4 8C AD 02 02
CE98:AC B4 02 B1 FB AC AD 02 05
CEA0:88 91 FD A5 FB 18 69 08 1C
CEA8:85 FB 90 02 E6 FC A5 FD AE
CEB0:18 6D B3 02 85 FD 90 02 93
CEB8:E6 FE CE BA 02 D0 C2 20 08
CEC0:14 CF 20 94 CF EE B4 02 4F
CEC8:AD B4 02 C9 08 90 A9 20 3D
CED0:E4 FF F0 18 85 02 60 A9 1F
CED8:04 8D 88 02 A9 93 20 D2 BB
CEE0:FF A9 15 8D 18 D0 A9 1B D6
CEE8:8D 00 DD 60 AD BE 02 F0 6C
CEF0:0D AD AB 02 CD BE 02 90 14
CEF8:05 A9 00 85 02 60 EE AB F6
CF00:02 AD AB 02 CD B5 02 B0 9B
CF08:03 4C 2C CE A9 00 8D AB C2
CF10:02 4C 2C CE AC AF 02 F0 4F
CF18:08 A2 32 CA D0 FD 88 D0 B7
CF20:F8 60 48 29 80 8D 37 CF 68
CF28:68 29 3F 48 AD 37 CF F0 8D
CF30:04 68 09 40 60 68 60 00 76
CF38:AC AC 02 20 87 CC B1 FB 6A
CF40:20 7D CC 20 6D CF A2 00 DA
CF48:BD 11 11 AC AD 02 91 FD 8E
CF50:EE AD 02 E8 E0 08 90 F0 DA
CF58:EE AC 02 AD AC 02 CD AE 6D
CF60:02 90 D5 60 A9 00 85 FD 3C
CF68:A9 C4 85 FE 60 A0 C0 8C 42
CF70:4A CF C9 40 90 05 A0 C1 02
CF78:8C 4A CF 18 0A 90 03 EE F3
CF80:4A CF 18 0A 90 03 EE 4A 95
CF88:CF 18 0A 90 03 EE 4A CF 98
CF90:8D 49 CF 60 A9 04 85 FC AE
CF98:A9 00 85 FB 60 00 00 00 80
```

Program 2: SCROLL.DEMO

```
FH 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS, INC. -
       ALL RIGHTS RESERVED
SM 20 IFPEEK(52234)<>8THENLOAD
      "ML-SCROLL",8,1
RE 30 DIMVT$(24):VT$(0)="
      {HOME}":FORI=1TO24:VT$(I
      )=VT$(I-1)+"{DOWN}":NEXT
BE 40 DIMA$(127):FORI=0TO123:R
      EADA$(I):IFA$(I)<>"-1"TH
      ENNEXTI
JA 50 POKE53280,0:POKE53281,0:
      SYS52230
CX 60 PRINT"{CLR}{CYN}":POKE70
      2,17:SYS52224,7,12,9,14,
      0,A$(6)
CD 70 PRINT"{HOME}{3 SPACES}CO
      PYRIGHT 1989 COMPUTE! PU
      B., INC."
FP 80 PRINTTAB(11)"ALL RIGHTS
      {SPACE}RESERVED"VT$(5)
EX 90 TX$="":FORI=1TO16:TX$=TX
      $+"Q":NEXTI
SD 100 PRINTTAB(11)"{RED}"TX$
QR 110 FORI=1TO9:PRINTTAB(11)"
      Q"TAB(26)"Q":NEXTI
RC 120 PRINTTAB(11)TX$"{CYN}"
QX 130 SYS52227:X=PEEK(2):IFXT
      HEN130
ER 140 GETA$:IFA$=""THEN140
RH 150 IFA$<"1"ORA$>"4"THEN60
AK 160 ONVAL(A$)GOTO180,240,33
      0,170
SD 170 SYS52230:END
RD 180 PRINT"{BLU}{CLR}":POKE7
      02,0:FORI=0TO20STEP5:FO
      RJ=0TO30STEP10
RE 190 SYS52224,I,J,5,10,100,A
      $(0)
CJ 200 NEXTJ,I
SR 210 PRINTVT$(5)TAB(10)"
      {YEL}THERE{RIGHT}ARE
      {RIGHT}NO{RIGHT}SPRITES
      "
HD 220 PRINTVT$(7)TAB(15)"USED
      {RIGHT}HERE!"VT$(10)TAB
      (14)"{RED}PRESS{RIGHT}A
      NY{RIGHT}KEY"
HH 230 SYS52227:PRINT"{CLR}":G
      OTO50
XR 240 POKE53280,15:POKE53281,
      15:PRINT"{CLR}{BLK}":PO
      KE702,0:TT$=""
MC 250 SYS52224,12,12,1,1,150,
      A$(32)
PD 260 FORI=1TO32:TT$=TT$+"@":
      NEXT
BP 270 FORI=0TO12:PRINTVT$(I+1
      )TAB(19-I)"{RVS}"LEFT$(
      TT$,I*2+1):NEXT
JM 280 FORI=13TO18:PRINTVT$(I)
      TAB(7)"{RVS}"LEFT$(TT$,
      25):NEXT
FG 290 PRINTVT$(23)TAB(9)"
      {RED}PRESS{RIGHT}ANY
      {RIGHT}KEY{RIGHT}TO
      {RIGHT}EXIT"
SR 300 PRINTVT$(14)TAB(10)"
      {BLU}PARTS{RIGHT}OF
      {RIGHT}THE{RIGHT}SCREEN
      "
JJ 310 PRINTVT$(16)TAB(11)"MAY
      {RIGHT}BE{RIGHT}A
      {RIGHT}BACKDROP"
FX 320 SYS52227:GOTO50
CQ 330 PRINT"{CLR}{CYN}MULTIPL
      E WINDOWS..."VT$(23)TAB
      (9)"PRESS ANY KEY TO EX
      IT":POKE702,0
RA 340 I=1:J=3
SH 350 GOSUB390:SYS52224,J,I,5
      ,10,255,A$(38)
JG 360 J=J+2:I=I*2:IFI<20THEN3
      50
EM 370 SYS52227
DQ 380 GOTO50
BE 390 PRINTVT$(J-1)TAB(I-1)"
      {RED}{A}**********{S}"
EB 400 FORIJ=1TO5:PRINTTAB(I-1
      )"-{WHT}{10 SPACES}
      {RED}-":NEXT
AX 410 PRINTTAB(I-1)"{Z}******
      ****{X}":RETURN
HH 420 DATA ,,"{A}********{S}"
      ,"-COMPUTE!-","{Z}*****
      ***{X}","<"
DF 430 DATA ,,,,,,,,,"{A}*****
      ********{S}","-
      {2 SPACES}OPTIONS
      {3 SPACES}-"
DH 440 DATA"-{12 SPACES}-","-
      {SPACE}(1) DEMO1
      {2 SPACES}-"
RD 450 DATA"- (2) DEMO2
      {2 SPACES}-","- (3) DEM
      O3{2 SPACES}-"
SR 460 DATA"- (4) QUIT
      {3 SPACES}-","-
      {12 SPACES}-"
EP 470 DATA"{Z}**********{X}
      ",,,,,,,,"<","↑","↑","<
      "
SX 480 DATA,,,"THERE ARE",,"**
       MANY **",," WINDOWS",
HJ 490 DATA" ON THIS",," SCREE
      N",," JUST ONE",,"
      {2 SPACES}OF THE",
RG 500 DATA" POSSIBLE",," EFFE
      CTS",," USING...",,"
      {2 SPACES}SMOOTH","SCRO
      LLING"
DE 510 DATA "{2 SPACES}WINDOWS
      ","{4 SPACES}64",,,,,,"
      <","-1"
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

Deluxe Input

See instructions in article on page 62 before typing in.

Program 1: DINPUT

```
C000:20 A6 B3 20 40 C0 20 73 6C
C008:00 20 8B B0 A5 48 85 FC 64
C010:A5 47 85 FB 20 40 C0 20 4A
C018:73 00 20 8B B0 A5 48 85 42
C020:FE A5 47 85 FD A0 00 84 C2
C028:FF 20 40 C0 20 B2 B1 A4 99
C030:FF A5 65 99 0D C3 C8 84 EE
C038:FF C0 06 D0 EC 4C 4B C0 A7
C040:A0 00 A9 2C D1 7A D0 01 25
C048:60 68 68 AD 0D C3 C9 50 57
C050:90 03 4C 48 B2 A5 D3 8D 4A
C058:0C C3 18 6D 0D C3 8D CE 0C
C060:C2 A8 AD 11 C3 30 53 C8 82
C068:98 48 A9 91 20 F5 C2 A9 9E
C070:6E 20 EB C2 88 A9 40 20 66
C078:EB C2 C4 D3 D0 F6 A9 70 9C
C080:20 EB C2 A9 11 20 F5 C2 B7
C088:68 48 A8 A9 5D 20 EB C2 06
C090:A4 D3 20 EB C2 A9 11 20 1B
C098:F5 C2 68 A8 A9 7D 20 EB CC
C0A0:C2 88 A9 40 20 EB C2 C4 D9
C0A8:D3 D0 F6 A9 6D 20 EB C2 48
C0B0:A9 91 20 F5 C2 A9 1D 20 E5
C0B8:F5 C2 AD 0E C3 F0 05 A9 12
C0C0:12 20 F5 C2 AE 0D C3 A0 10
C0C8:02 B1 FB 8D E6 C0 88 B1 0D
C0D0:FB 8D E5 C0 88 B1 FB 8D 0D
C0D8:DD C0 A0 00 C0 00 F0 0F 84
C0E0:E0 00 F0 0B B9 00 00 20 8F
C0E8:F5 C2 C8 CA 4C DC C0 CA FD
C0F0:30 07 A9 20 20 F5 C2 D0 B2
C0F8:F6 AE 0D C3 F0 09 A9 9D 1C
C100:20 F5 C2 CA 4C FC C0 A9 97
```

```
C108:00 8D 13 C3 85 C6 A2 00 1A
C110:A0 00 84 D4 20 A0 C1 9D 66
C118:00 02 E8 C9 0D D0 F1 CA 30
C120:A9 00 9D 00 02 8A A0 00 A7
C128:91 FB A9 00 A0 02 A2 00 FA
C130:20 89 B4 A0 01 A5 33 91 5D
C138:FB C8 A5 34 91 FB C6 16 04
C140:C6 16 C6 16 AD 14 C3 8D B9
C148:00 02 A9 00 8D 01 02 A9 9F
C150:00 A0 02 A2 00 20 89 B4 AE
C158:A0 00 A9 01 91 FD C8 A5 2D
C160:33 91 FD C8 A5 34 91 FD 4D
C168:C6 16 C6 16 C6 16 AD 11 0A
C170:C3 30 24 AD 0C C3 85 D3 8F
C178:A9 91 20 F5 C2 A2 03 A5 E4
C180:D3 6D 0D C3 A8 C8 A9 20 03
C188:91 D1 88 C4 D3 10 F7 A9 1F
C190:11 20 F5 C2 CA D0 E8 A9 A4
C198:01 85 CC A9 0D 4C F5 C2 7A
C1A0:A5 D3 85 CA A5 D6 85 C9 A6
C1A8:98 48 8A 48 A5 D0 F0 0B BD
C1B0:4C 3A E6 A2 00 8E 92 02 51
C1B8:20 F5 C2 A5 CD C9 14 D0 0B
C1C0:05 AD 0F C3 85 CD A5 C6 C5
C1C8:85 CC 8D 92 02 F0 EC 78 43
C1D0:A5 CF F0 0C A5 CE AE 87 47
C1D8:02 A0 00 84 CF 20 13 EA DD
C1E0:20 B4 E5 AE FF C2 DD FF 10
C1E8:C2 D0 03 4C CA C2 CA D0 EE
C1F0:F5 C9 14 F0 6E C9 1D F0 39
C1F8:4B C9 20 90 C9 C9 7F 90 A6
C200:08 C9 9D F0 50 C9 C0 90 7A
C208:BD AE 13 C3 EC 0D C3 D0 AA
C210:6C AD 10 C3 F0 B0 A9 0F 22
C218:8D 18 D4 A9 09 8D 05 D4 FC
C220:A9 00 8D 06 D4 A9 4A 8D FB
C228:01 D4 A9 0A 8D 00 D4 A9 F8
C230:11 8D 04 D4 A2 64 20 B3 0A
C238:EE CA 10 FA A9 10 8D 04 46
C240:D4 4C C6 C1 AE 13 C3 EC 6E
C248:0D C3 F0 F5 EE 13 C3 20 2E
C250:16 E7 4C C6 C1 AE 13 C3 83
C258:F0 E7 CE 13 C3 20 16 E7 0E
C260:4C C6 C1 AE 13 C3 F0 D9 44
C268:A9 9D 20 F5 C2 A9 20 20 AA
C270:F5 C2 A9 9D 20 F5 C2 CE DD
C278:13 C3 4C C6 C1 AE 12 C3 1F
C280:F0 3E E0 01 F0 2B E0 02 32
C288:F0 14 E0 03 F0 1B E0 04 91
C290:F0 03 4C 48 B2 C9 41 90 2D
C298:27 09 80 4C C0 C2 C9 5B C8
C2A0:B0 1B C9 41 90 17 4C C0 CC
C2A8:C2 C9 5B B0 10 C9 41 B0 53
C2B0:0F C9 2D 90 08 C9 3A B0 6B
C2B8:04 C9 2F D0 03 4C C6 C1 3E
C2C0:AE 13 C3 E8 8E 13 C3 4C FD
C2C8:B3 C1 8D 14 C3 A0 00 84 B0
C2D0:D0 B1 D1 C9 20 F0 04 C9 98
C2D8:A0 D0 03 88 D0 F3 C8 4C FF
C2E0:10 E6 CE 13 C3 20 16 E7 E5
C2E8:4C C6 C1 48 91 D1 AD 11 43
C2F0:C3 91 F3 68 60 48 A9 00 39
C2F8:85 D4 68 20 16 E7 60 01 97
C300:0D 00 00 00 00 00 00 00 0E
C308:00 00 00 00 00 14 01 0A EB
C310:01 0E 00 00 00 00 00 00 9B
```

Program 2: Deluxe Demo

```
HE 10 REM COPYRIGHT 1988 COMPU
      TE! PUBLICATIONS, INC. -
       ALL RIGHTS RESERVED
AJ 20 IFPEEK(49152)<>32ANDA=0T
      HENA=1:LOAD"DINPUT",8,1
JX 30 REM PUT LINE 20 AT THE B
      EGINNING OF YOUR PROGRAM
EK 40 POKE53280,11:POKE53281,0
      :B$=CHR$(13):GOSUB 530:P
      RINT"{CLR}{CYN}
CK 50 PRINTTAB(12)"COPYRIGHT 1
      988"
FE 60 PRINTTAB(7)"COMPUTE! PUB
      LICATIONS, INC."
QH 70 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED{DOWN}"
GC 80 L=20:R=0:FL=20:BL=0:BX=2
      55:CS=0
GR 90 PRINT"{N}{WHT}DELUXE INP
      UT {GRN}CAN ADD QUITE A
      {SPACE}BIT OF"
DK 100 PRINT"SPICE TO YOUR PRO
       GRAMS.{2 SPACES}IT ALSO
       ALLOWS"
BH 110 PRINT"A MUCH BETTER WAY
       TO INPUT DATA FROM "
FD 120 PRINT"THE KEYBOARD.
       {2 SPACES}ITS FUNCTIONS
       INCLUDE:{CYN}"
AH 130 PRINT:PRINT"I. DEFINING
       THE MAXIMUM LENGTH OF
       {SPACE}THE"
MD 140 PRINT"{4 SPACES}INPUT F
       IELD (EX. 5 CHARS.)
       {3 SPACES}:";:L=5:GOSUB
       510
XP 150 PRINT:PRINT"II. REVERSI
       NG THE INPUT FIELD
       {4 SPACES}:";:R=1:GOSUB
       510
EK 160 PRINT:PRINT"III. FLASHI
       NG THE CURSOR FASTER
       {2 SPACES}:";:FL=10:GOS
       UB510
DD 170 PRINT:PRINT"IV. A BELL
       {SPACE}AT THE END OF IN
       PUT{3 SPACES}:";:BL=1:G
       OSUB510
XH 180 PRINT:PRINT"V. PUTTING
       {SPACE}A BORDER AROUND
       {SPACE}INPUT:";:BX=1:GO
       SUB510
CD 190 PRINT"{2 UP}{6 SPACES}
       {RED}(NOTICE THE BORDER
       DISAPPEARS!){CYN}"
SC 200 PRINT:PRINT"VI. ALLOWIN
       G-"
EM 210 PRINT"ALL CHARACTERS
       {6 SPACES}";:CS=0:BX=25
       5:L=9:GOSUB510
DH 220 PRINT"NUMBERS ONLY
       {8 SPACES}";:CS=1:GOSUB
       510
GQ 230 PRINT"LETTERS ONLY
       {8 SPACES}";:CS=2:GOSUB
       510
RH 236 PRINT"LETTERS & NUMBERS
       {3 SPACES}";:CS=3:GOSUB
       510
QQ 238 PRINT"SHIFTS TO UPPERCA
       SE ";:CS=4:GOSUB510
CA 240 CS=0:L=3:BX=4:R=0:FL=25
       5
RM 250 PRINT:PRINT"IT ALSO ALL
       OWS A PROMPT TO BE PUT
       {SPACE}IN"
AE 260 PRINT"THE FIELD (AND TH
       E CURSOR CAN BE A "
DA 270 PRINT"BLOCK, TOO!)"
RA 280 PRINT"DO YOU WISH TO CO
       NTINUE? ";:A$="YES":GOS
       UB520
XE 290 IFA$="N"ORA$="NO"THENPR
       INT"{WHT}OF COURSE YOU
       {SPACE}DO{CYN}"
QX 300 PRINT:PRINT"IF THE LENG
       TH = 0, A FANCY 'GET' "
PH 310 PRINT"STATEMENT RESULTS
       ....."
FJ 320 PRINT:PRINT"{WHT}PRESS
       {SPACE}RETURN...{CYN}";
       :BL=0:BX=255:L=0:R=0:FL
       =10:GOSUB510
HR 330 PRINT:PRINT"{WHT}DELUXE
       INPUT{CYN} WILL ALSO A
       LLOW"
ER 340 PRINT"'ILLEGAL' CHARACT
       ERS SUCH AS QUOTES,"
SR 350 PRINT"COMMAS, AND COLON
       S:";
KX 360 L=10:BL=1:FL=5:R=1:A$=C
       HR$(34)+CHR$(34)+",,,::
       :":GOSUB520
QF 370 PRINT:PRINT"YOU CAN ALS
       O CHANGE WHICH CHARACTE
       RS"
GK 380 PRINT"EXIT INPUT..ALL T
       HE FUNCTION KEYS WILL"
AB 390 PRINT"EXIT, BUT RETURN
       {SPACE}WILL NOT.){DOWN}
       "
RE 400 B$="{F1}{F2}{F3}{F4}
       {F5}{F6}{F7}{F8}":GOSUB
       530
MC 410 FL=20:BX=3:GOSUB510
CG 420 PRINT"{DOWN}{WHT}DELUXE
        INPUT {CYN}CAN EVEN TE
       LL WHICH"
JE 430 PRINT"CHARACTER WAS USE
       D TO EXIT..."
EX 440 PRINT"{DOWN}YOU USED CH
       R$("ASC(B$)") TO EXIT."
RX 450 B$=CHR$(13):GOSUB530
SF 460 PRINT:PRINT"{GRN}VIRTUA
       LLY ALL OF THESE USEFUL
        FUNCTIONS"
FB 470 PRINT"ARE AVAILABLE WIT
       HOUT POKES. YOU JUST"
SD 480 PRINT"USE THE SIMPLE CO
       MMAND FORM:"
JR 490 PRINT:PRINT"{WHT}SYS491
       52,A$,B$,LIMIT,RVS,CURS
       PEED,BELL, BOX,CASE"
BS 500 PRINT"{CYN}":END
BE 510 A$=""
FR 520 PRINT"{YEL}";:SYS49152,
       A$,B$,L,R,FL,BL,BX,CS:P
       RINT"{CYN}";:RETURN
FD 530 POKE49919,LEN(B$):FORX=
       1TOLEN(B$):POKE49919+X,
       ASC(MID$(B$,X,1))
BJ 540 NEXT:RETURN
FC 550 POKE782,X:POKE781,Y:SYS
       65520:RETURN
```

Handy Filer

See instructions in article on page 76 before typing in.

```
0801:0B 08 0A 00 9E 32 30 36 2E
0809:31 00 00 00 A9 05 8D 20 4E
0811:D0 A9 01 8D 21 D0 20 36 AF
0819:0A A2 04 AD 6A 1B F0 0B DE
0821:E8 AD 67 1B 0D 68 1B F0 E0
0829:02 A2 0D 8E 34 03 20 65 C0
0831:08 20 B9 09 AE 34 03 CA 2C
0839:DD 6E 09 F0 09 CA 10 F8 90
0841:20 74 14 4C 1A 08 8A 0A D5
0849:AA BD 7C 09 48 BD 7B 09 77
0851:48 60 A5 01 09 01 85 01 BA
0859:60 AD 4B 09 49 01 8D 4B B3
0861:09 4C 1A 08 20 5B 0A A2 F1
0869:04 A0 0A 18 20 F0 FF A0 CB
0871:00 B9 8F 08 F0 17 20 8E 15
0879:0A C8 C9 0D D0 F3 B9 8F 24
0881:08 C8 CD 34 03 B0 F7 A9 39
0889:07 85 D3 D0 E4 60 96 2A 06
0891:2A 20 20 4F 50 54 49 4F 6D
0899:4E 53 3A 20 20 20 2A 2A EE
08A1:9A 0D 01 0D 04 28 41 29 9F
08A9:20 2D 20 41 44 44 20 A2 43
08B1:0D 05 28 45 29 20 2D 20 27
08B9:45 44 49 54 2F 56 49 45 96
08C1:57 20 B2 0D 01 28 4C 29 17
08C9:20 2D 20 AC 20 B9 20 B2 DE
08D1:0D 01 28 4E 29 20 2D 20 D6
```

```
08D9:44 45 46 49 4E 45 20 4E D0
08E1:45 57 20 A2 0D 05 28 50 B5
08E9:29 20 2D 20 A6 B2 0D 05 5D
08F1:28 48 29 20 2D 20 48 55 1F
08F9:4E 54 20 46 4F 52 20 A2 55
0901:0D 05 28 46 29 20 2D 20 88
0909:53 41 56 45 20 B2 0D 05 1F
0911:28 44 29 20 2D 20 BA 45 14
0919:20 B2 0D 05 28 56 29 20 E6
0921:2D 20 B8 45 20 B9 0D 05 44
0929:28 53 29 20 2D 20 AD 20 B0
0931:B2 0D 05 28 58 29 20 2D D7
0939:20 A8 20 A2 BF 0D 01 28 10
0941:42 29 20 2D 20 42 45 45 6F
0949:50 20 B7 0D 01 28 51 29 C7
0951:20 2D 20 51 55 49 54 20 70
0959:50 52 4F 47 52 41 4D 0D C5
0961:01 1E 20 5E 20 0D 01 20 BC
0969:B3 B4 3A 81 00 4E 51 4C 0A
0971:42 41 45 50 46 53 48 58 0B
0979:44 56 8E 0D 52 08 61 18 73
0981:59 08 57 10 E5 11 0B 16 CD
0989:CB 18 1A 15 B4 11 A2 0E 59
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0999:00 20 CF FF C9 0D F0 0F 21
09A1:C9 A3 F0 0B CC 43 03 B0 7A
09A9:6E 99 00 02 C8 D0 EA 8C 65
09B1:35 03 18 98 60 20 6E 0A 16
09B9:20 7A 14 A9 00 85 CC 20 67
09C1:E4 FF F0 FB 48 A9 02 85 96
09C9:CD A5 CF D0 FC E6 CC 68 B8
09D1:60 A6 D3 86 2A AA 20 2C 09
09D9:0A A5 2A 85 D3 20 7A 14 20
09E1:A9 00 8D 36 03 20 CF FF 16
09E9:29 7F C9 20 F0 F7 C9 0D B3
09F1:F0 1D 38 E9 30 C9 0A B0 D6
09F9:1B 85 02 AD 36 03 C9 18 7F
0A01:B0 15 0A 0A 6D 36 03 0A E8
0A09:65 02 8D 36 03 90 D6 AD 1B
0A11:36 03 18 60 A9 25 2C A9 ED
0A19:26 4C 71 14 8C 34 03 20 1E
0A21:6E 0A 20 DE 09 CD 34 03 CB
0A29:B0 ED 60 A9 00 48 20 53 6C
0A31:08 68 20 CD BD A5 01 29 F3
0A39:FE 85 01 60 A9 20 20 D2 35
0A41:FF CA D0 FA 60 A9 12 2C CB
0A49:A9 92 2C A9 96 2C A9 1F CE
0A51:2C A9 1E 2C A9 9E 2C A9 36
0A59:13 2C A9 93 4C 16 E7 A9 A4
0A61:20 2C A9 0D 4C D2 FF 48 8C
0A69:18 20 F0 FF 68 0A A8 B9 26
0A71:7E 0B 85 22 B9 7F 0B 85 C1
0A79:23 20 52 0A A0 00 B1 22 9C
0A81:F0 06 20 8E 0A C8 D0 F6 88
0A89:A9 81 4C D2 FF C9 A1 90 84
0A91:25 84 02 A0 00 E9 A1 AA 39
0A99:F0 0A C8 B9 BA 0A 10 FA 76
0AA1:CA D0 F7 C8 B9 BA 0A 30 D7
0AA9:05 20 D2 FF D0 F5 C9 AD 42
0AB1:F0 02 29 7F A4 02 4C D2 74
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0AD9:4F 4E 54 49 4E 55 C5 50 EB
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0AE9:55 4D CE 43 48 41 4E 47 35
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0B41:4F 46 C6 56 41 4C 49 44 E0
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0B61:AF 28 50 29 52 49 4E 54 9E
0B69:AF 28 56 29 49 45 57 AF 7C
0B71:46 4F 52 4D 41 D4 42 4C CB
0B79:4F 43 4B 53 A0 DE 0B E9 27
0B81:0B F6 0B FF 0B 0C 0C 1B F7
0B89:0C 1F 0C 22 0C 27 0C 2F 55
0B91:0C 37 0C 4E 0C 53 0C 5A 02
0B99:0C 63 0C 67 0C 6A 0C 71 1A
0BA1:0C 79 0C 81 0C 8B 0C 90 EC
0BA9:0C B6 0C BD 0C C1 0C D4 25
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0C19:21 00 9E B1 B2 00 AC B5 55
0C21:00 53 41 56 B5 00 0D 0D 70
0C29:BC BD BE B0 3A 00 0D 0D EA
0C31:A3 53 2F AB 3A 00 0D 0D 89
0C39:A6 A7 28 30 3D 53 55 52 CA
0C41:50 52 45 53 53 29 3A 20 C7
0C49:2C 31 36 31 2C 0D B1 AB 42
0C51:21 00 0D 0D A3 20 A9 3A 97
0C59:00 0D A1 20 AD 20 AE 3A 70
0C61:0D 00 0D AE 2D 00 AD B5 07
0C69:00 0D B4 20 AF A1 3A 00 D5
0C71:B2 20 4E 41 4D 45 3A 00 BC
0C79:93 0D A6 BF 3A 0D 0D 00 8F
0C81:0D 0D 20 A5 20 AF 3F 20 20
0C89:AA 00 96 A2 BF 0D 00 0D 33
0C91:28 4E 29 45 58 54 2F 28 65
0C99:42 29 41 43 4B 2F BC 28 32
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0CA9:28 54 29 59 50 45 0D BD 15
0CB1:B0 20 B4 3A 00 B9 20 B2 3E
0CB9:53 3A 0D 00 20 A9 3A 00 C7
0CC1:0D 20 20 20 41 52 45 20 6C
0CC9:59 4F 55 20 53 55 52 45 E8
0CD1:3F AA 00 9E 20 57 41 49 48
0CD9:54 2E 2E 2E 2E 00 0D 0D E8
0CE1:A1 3A 00 0D A7 3A 00 20 70
0CE9:20 A3 3A 00 0D 0D A8 20 50
0CF1:AE 3F AA 00 20 A2 00 20 32
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10D1:1B D0 03 EE 68 1B AD 67 75
10D9:1B 8D 47 03 AD 68 1B 8D D6
10E1:48 03 20 4F 14 A9 2E 20 A3
10E9:E0 11 D0 0B EE 46 03 20 40
10F1:77 13 CE 46 03 F0 EE 4C D6
10F9:58 10 AD 3E 03 D0 05 20 69
1101:F1 13 90 02 18 60 A0 00 96
1109:B1 FD D1 FB D0 1B C8 CC CE
1111:43 03 90 F4 20 77 13 20 1C
1119:CD 0F A9 24 20 71 14 20 6C
1121:B9 09 C9 59 F0 08 38 B0 F9
1129:06 20 2E 14 90 D8 18 A5 1B
1131:FB 85 FD A5 FC 85 FE 60 29
1139:20 63 0A A9 04 85 D3 20 1E
1141:4C 0A AE 3E 03 E8 20 2C ED
1149:0A A9 2D 20 D2 FF 20 4F A8
1151:0A A0 07 B1 14 20 D2 FF 63
1159:C8 CC 45 03 90 F5 60 A9 B2
1161:3A 4C D2 FF A0 00 A9 20 86
1169:91 FD C8 CC 43 03 90 F8 F9
1171:AE 35 03 AD 44 03 C9 52 87
1179:F0 0A AC 35 03 10 05 BD 9F
1181:00 02 91 FD 88 CA 10 F7 BD
1189:18 60 A5 D3 85 FF 18 6D 8B
1191:43 03 C9 28 B0 F3 A9 11 8B
1199:20 D2 FF A9 A3 20 AB 11 21
11A1:20 A9 11 A9 91 4C D2 FF 5E
11A9:A9 9D AE 43 03 20 D2 FF 50
11B1:CA D0 FA 60 20 F1 13 20 E1
11B9:98 12 F0 1E 20 DE 12 D0 1E
11C1:0C 20 77 13 A9 13 20 B6 A2
11C9:09 C9 59 D0 1B 20 2E 14 E4
11D1:90 EA 20 5B 0A A9 05 20 D1
11D9:71 14 4C 1A 08 A9 18 20 1C
11E1:B6 09 C9 59 60 20 F1 13 EA
11E9:20 77 13 A9 15 A2 16 A0 F6
11F1:01 20 68 0A 20 B9 09 C9 0E
11F9:44 D0 15 20 DE 11 D0 E8 DC
1201:20 2D 13 20 42 14 90 E0 49
1209:20 4F 14 90 DB 4C 1A 08 E8
1211:C9 43 D0 0B EE 46 03 20 6C
1219:77 13 CE 46 03 F0 C9 C9 35
1221:42 D0 07 20 4F 14 90 C0 2A
1229:B0 0C C9 4E D0 0D 20 2E EF
1231:14 90 B5 20 4F 14 A9 05 5F
1239:20 6E 0A C9 50 D0 06 20 D8
1241:C2 16 4C E9 11 C9 54 D0 9D
1249:0F 20 3F 18 20 77 13 20 8B
1251:63 0A 20 57 18 4C E9 11 F9
1259:C9 0D D0 03 4C 1A 08 20 EA
1261:74 14 4C E9 11 20 5B 0A B6
1269:A9 14 A2 02 A0 09 20 68 AD
1271:0A 20 CD 0F 20 39 11 A9 FE
1279:0A CD 43 03 69 14 85 D3 29
1281:AE 43 03 20 2C 0A AD 44 59
1289:03 20 D2 FF 20 15 14 90 9F
1291:E3 20 63 0A 4C 89 0A 20 79
1299:66 12 A9 10 20 6E 0A AD 28
12A1:6C 1B 20 D2 09 B0 F3 AA 91
12A9:F0 32 CA EC 6A 1B B0 EA 07
12B1:8D 6C 1B 20 63 0A 20 63 04
12B9:0A 20 CD 0F 84 50 AD 43 99
12C1:03 18 65 50 CA 30 07 85 C9
12C9:50 20 15 14 90 F0 85 51 A6
12D1:20 52 11 20 60 11 20 8B D1
12D9:11 20 95 09 60 A4 50 84 8C
12E1:52 A4 52 E6 52 C4 51 90 E9
12E9:02 98 60 B1 FD C9 20 F0 A4
12F1:F0 A2 00 AD 00 02 C9 2A D7
12F9:D0 06 E8 EC 35 03 F0 2B B6
1301:BD 00 02 C9 2A F0 24 C9 0A
1309:3F F0 0C D1 FD F0 08 AD 1B
1311:00 02 C9 2A F0 CB 60 C8 D3
1319:E8 EC 35 03 90 E2 C4 51 B0
1321:F0 09 B0 07 B1 FD C8 C9 69
1329:20 F0 F3 60 A5 FD 85 26 76
1331:18 6D 69 1B 85 28 A5 FE B4
1339:85 27 69 00 85 29 A0 00 2B
1341:F0 10 B1 28 91 26 E6 28 B7
1349:D0 02 E6 29 E6 26 D0 02 3B
1351:E6 27 A5 29 CD 64 1B D0 03
1359:05 A5 28 CD 63 1B 90 E2 D8
1361:A5 26 8D 63 1B A5 27 8D 17
1369:64 1B AD 67 1B D0 03 CE A5
1371:68 1B CE 67 1B 60 A5 14 9C
1379:48 A5 15 48 A5 FD 48 A5 AF
1381:FE 48 20 CD 0F 20 5B 0A D3
1389:A2 0D 20 3D 0A A9 28 20 83
1391:D2 FF AE 47 03 AC 48 03 C9
1399:E8 D0 01 C8 98 20 2E 0A C0
13A1:A9 29 20 D2 FF 20 63 0A 69
13A9:AD 6A 1B C9 0A B0 03 20 7A
13B1:63 0A 20 4F 0A 20 52 11 8B
13B9:20 60 11 20 89 0A A0 00 E1
13C1:B1 FD 20 D2 FF C8 CC 43 71
13C9:03 90 F5 AD 46 03 F0 0E 5D
13D1:20 A9 11 20 8B 11 20 95 0D
13D9:09 B0 CA 20 65 11 20 09 C4
13E1:14 90 C2 68 85 FE 68 85 93
13E9:FD 68 85 15 68 85 14 60 0D
13F1:AD 61 1B 85 FD AD 62 1B 89
13F9:85 FE A0 00 8C 46 03 8C C6
1401:47 03 8C 48 03 4C 42 14 85
1409:18 A5 FD 6D 43 03 85 FD 6C
1411:90 02 E6 FE AD 45 03 18 6F
1419:65 14 85 14 90 02 E6 15 5A
1421:20 DA 0F EE 3E 03 AD 3E 78
1429:03 CD 6A 1B 60 18 A5 FD F1
1431:6D 69 1B 85 FD 90 02 E6 43
1439:FE EE 47 03 D0 03 EE 48 6E
1441:03 A5 FE CD 64 1B D0 05 47
1449:A5 FD CD 63 1B 60 38 AD 2C
1451:47 03 0D 48 03 F0 18 A5 B5
1459:FD 38 ED 69 1B 85 FD B0 7E
1461:02 C6 FE AD 47 03 D0 03 E1
1469:CE 48 03 CE 47 03 18 60 2F
1471:20 6E 0A A2 FF A9 0C D0 40
1479:10 EE 49 03 F0 34 AD 4B BD
1481:09 C9 B7 D0 2D A2 64 A9 0B
1489:5C 8D 01 D4 8E 49 03 A2 F2
1491:05 BD C1 14 9D 02 D4 CA 8E
1499:10 F7 A9 0F 8D 18 D4 A9 0E
14A1:41 8D 04 D4 AE 49 03 20 5C
14A9:B4 14 9D 00 D4 E8 E0 08 F8
14B1:90 F8 60 A9 00 18 69 01 3B
14B9:90 FB CA D0 F8 86 C6 60 5F
14C1:02 08 40 08 FF 20 66 12 D4
14C9:20 CD 0F 8C 4B 03 A0 03 CA
14D1:A9 00 91 14 20 15 14 90 50
14D9:F5 EE 4B 03 A9 0E 20 6E 86
14E1:0A AE 4B 03 20 2C 0A 20 3A
14E9:60 11 20 DE 09 B0 ED F0 50
14F1:29 8D 4C 03 20 CD 0F AC CE
14F9:3E 03 C8 CC 4C 03 F0 0A 42
1501:20 15 14 90 F2 20 74 14 21
1509:B0 D2 A0 03 B1 14 D0 F5 F9
1511:AD 4B 03 91 14 CD 6A 1B 26
1519:90 BF 20 5B 0A A9 0D 20 66
1521:6E 0A A9 00 8D 4B 03 F0 CA
1529:03 20 39 11 EE 4B 03 20 DF
1531:CD 0F AD 42 03 CD 4B 03 C8
1539:F0 EF 20 15 14 90 F3 A9 A1
1541:1D 20 E0 11 D0 03 4C C6 21
1549:14 AD 4B 03 F0 3E 20 C8 0C
1551:15 20 F1 13 A9 0F 20 2A 71
1559:1B A5 FD 85 FB 85 26 A5 7A
1561:FE 85 FC 85 27 18 A5 FB 45
1569:6D 69 1B 85 FB A5 FC 69 3A
1571:00 85 FC CD 64 1B D0 05 AF
1579:A5 FB CD 63 1B B0 05 20 2B
1581:90 15 B0 E1 20 B5 15 20 8F
1589:2E 14 90 CD 4C 1A 08 A2 3C
1591:00 BD 70 03 A8 B1 FB D1 3F
1599:26 D0 0D C8 98 DD B0 03 D9
15A1:90 F3 E8 EC 4B 03 90 E9 6E
15A9:B0 09 A5 FB 85 26 A5 FC EF
15B1:85 27 38 60 A0 00 B1 FD DB
15B9:AA B1 26 91 FD 8A 91 26 E6
15C1:C8 CC 69 1B 90 F0 60 20 8B
15C9:CD 0F 8C 4A 03 AE 42 03 2F
15D1:AD 4A 03 9D 6F 03 18 6D C4
15D9:43 03 8D 4A 03 9D AF 03 AD
15E1:20 15 14 90 E8 60 20 CD C3
15E9:0F 20 63 0A 20 24 18 A9 1C
15F1:1B A0 00 20 08 18 20 15 C9
15F9:14 90 F1 A9 09 20 6E 0A DA
1601:AD 6B 1B 20 D2 09 B0 F3 54
1609:8D 6B 1B A9 FF 8D 52 03 B2
1611:20 F6 16 20 F1 13 A9 08 07
1619:20 6E 0A A9 21 20 B6 09 CC
1621:C9 43 F0 C2 C9 4D F0 14 C6
1629:C9 0D F0 75 AE 6B 1B C9 16
1631:50 F0 1A C9 56 F0 16 20 64
1639:74 14 B0 DA 20 98 12 F0 E0
1641:CA A9 FF 8D 4E 03 A9 23 0B
1649:20 B6 09 D0 DB 85 2A 8E 39
1651:4D 03 20 5B 0A AD 4E 03 45
1659:10 0C 20 DE 12 F0 07 20 05
1661:2E 14 90 F6 B0 25 20 39 BE
1669:18 20 24 17 20 57 18 AD DB
1671:52 03 F0 73 20 42 14 B0 BF
1679:12 20 E4 FF D0 23 CE 4D 51
1681:03 D0 D2 A9 0B 20 6E 0A 18
1689:4C 47 16 20 39 18 20 63 40
1691:0A CE 4D 03 10 F8 20 57 4C
1699:18 A9 05 20 6E 0A 20 E8 A3
16A1:16 4C 1A 08 20 CD 0F 20 26
16A9:24 18 A9 1B A0 01 20 08 26
16B1:18 C9 00 F0 07 A9 1C A0 23
16B9:02 20 08 18 20 15 14 90 7F
16C1:E6 A9 00 8D 52 03 20 F6 7A
16C9:16 A9 08 20 B6 09 C9 43 1F
16D1:F0 D2 C9 50 F0 04 C9 56 EA
16D9:D0 03 4C 4E 16 C9 0D F0 80
16E1:05 20 74 14 B0 E3 60 A5 E3
16E9:2A C9 50 F0 F9 20 63 0A D7
16F1:A9 28 4C B6 09 A9 00 8D 6E
16F9:4E 03 A9 12 20 6E 0A 20 53
1701:24 17 EE 4E 03 AD 52 03 40
1709:F0 16 A9 0C 20 6E 0A AE A8
1711:51 03 20 2C 0A A9 09 20 98
1719:6E 0A AE 6B 1B 20 2C 0A 49
1721:4C 63 0A 20 FB 17 8C 50 37
1729:03 AD 52 03 8D 4F 03 A5 14
1731:FD 85 26 A5 FE 85 27 EE 2A
1739:4F 03 20 91 17 AD 4F 03 FD
1741:F0 08 A5 26 85 FD A5 27 97
1749:85 FE AC 51 03 A9 0D 91 0F
1751:FB 98 65 FB 85 FB 90 02 4F
1759:E6 FC AD 4F 03 CD 50 03 D7
1761:90 D5 A9 00 A8 91 FB 20 26
1769:FB 17 A0 00 20 46 0A B1 4F
1771:FB F0 17 E6 FB D0 02 E6 39
1779:FC 20 D2 FF C9 0D D0 EF 9C
1781:AD 86 02 49 0F 8D 86 02 BA
1789:D0 E2 20 89 0A 4C 49 0A 93
1791:20 CD 0F 8C 51 03 A9 20 F7
1799:91 FB 88 D0 FB AD 52 03 EB
17A1:30 16 AD 41 03 CD 50 03 2A
17A9:90 03 8D 50 03 CD 4F 03 88
17B1:D0 42 AD 40 03 8D 3F 03 62
17B9:CE 3F 03 30 37 A5 FB 18 E2
17C1:6D 3F 03 85 28 A5 FC 69 6A
17C9:00 85 29 A0 00 B1 FD AE F9
17D1:4E 03 D0 0B AD 3E 03 69 88
17D9:31 C9 3A 90 02 69 06 91 B6
17E1:28 C8 CC 43 03 90 E6 98 E4
17E9:18 6D 3F 03 CD 51 03 90 E1
17F1:03 8D 51 03 20 09 14 90 3D
17F9:A4 60 AD 63 1B 85 FB AD 13
1801:64 1B 85 FC A0 00 60 8D FD
1809:4F 03 8C 50 03 AD 4F 03 A8
1811:20 6E 0A AC 50 03 B1 14 FE
1819:20 D2 09 B0 F0 AC 50 03 18
1821:91 14 60 A9 1A 20 6E 0A FD
1829:20 40 11 A9 17 20 6E 0A 56
1831:A0 04 B1 14 AA 4C 2C 0A 13
1839:A5 2A C9 50 D0 15 A9 00 33
1841:20 BD FF A0 FF A9 04 AA 54
1849:20 BA FF 20 C0 FF A2 04 89
1851:4C C9 FF 4C 63 0A 20 CC 2F
1859:FF 20 CC FF A9 04 4C C3 E4
1861:FF A9 52 8D 60 1B 20 28 F6
1869:1A D0 5D 20 94 19 D0 58 8B
1871:A9 06 20 2A 1B A2 08 20 32
1879:C6 FF A9 2F A2 0C A0 0E C9
1881:20 68 0A A0 00 8C 3D 03 D6
1889:EE 3D 03 AE 3D 03 A5 D3 E0
1891:48 20 2C 0A 68 85 D3 A0 B5
1899:00 20 CF FF 91 FD A5 90 2C
18A1:D0 07 C8 D0 F4 E6 FE D0 34
18A9:DF 98 38 65 FD 8D 63 1B 55
18B1:A5 FE 69 00 8D 64 1B A9 7F
18B9:65 18 6D 65 1B 8D 61 1B 93
18C1:A9 1B 6D 66 1B 8D 62 1B 90
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18C9:4C 21 19 38 AD 61 1B E9 22
18D1:65 8D 65 1B AD 62 1B E9 8D
18D9:1B 8D 66 1B A9 57 8D 60 9F
18E1:1B 20 EF 19 D0 03 4C 1A 7C
18E9:08 20 86 19 D0 32 20 94 AC
18F1:19 F0 14 C9 23 F0 29 A9 E2
18F9:00 85 AA A9 22 20 E0 11 DF
1901:D0 1E 20 9F 19 D0 19 A9 09
1909:07 20 2A 1B A2 08 20 C9 FC
1911:FF A0 00 B1 FD 20 D2 FF 9C
1919:20 21 1A 20 42 14 90 F3 60
1921:20 CC FF A9 08 20 C3 FF 79
1929:A9 0F 20 C3 FF A5 AA F0 11
1931:03 20 74 14 4C 1A 08 20 B7
1939:28 1A D0 E4 20 DE 11 D0 DD
1941:DF A9 29 20 2A 1B A2 0F 07
1949:20 C9 FF A0 01 A9 53 20 7D
1951:D2 FF B9 4A 1B C8 C0 14 5A
1959:90 F5 4C 21 19 A9 00 8D E9
1961:4D 1B A9 2B 20 2A 1B A9 72
1969:56 8D 46 1B 20 86 19 A9 9B
1971:49 8D 46 1B D0 AA A9 02 AC
1979:A2 48 A0 1B 20 BD FF A9 76
1981:01 A0 00 F0 2A A9 02 A2 0A
1989:46 A0 1B 20 BD FF A9 0F BC
1991:A8 D0 1C 20 18 1A A2 4D 8D
1999:A0 1B A9 14 D0 0B A9 08 67
19A1:20 C3 FF A9 17 A2 4A A0 E7
19A9:1B 20 BD FF A9 08 A8 A2 8A
19B1:08 20 BA FF 20 C0 FF 20 6B
19B9:CC FF A9 00 85 AA 20 63 02
19C1:0A A2 0F 20 C6 FF 20 CF CB
19C9:FF C9 31 90 14 85 AA 20 C9
19D1:CF FF 20 CF FF 20 CF FF 0D
19D9:C9 2C F0 05 20 D2 FF D0 87
19E1:F4 20 CF FF C9 0D D0 F9 AE
19E9:20 CC FF A5 AA 60 A9 0F F2
19F1:8D 43 03 A9 11 20 2A 1B 2F
19F9:A9 12 85 D3 20 95 09 F0 CD
1A01:15 A0 00 B9 00 02 CC 35 5A
1A09:03 90 02 A9 20 99 4D 1B DA
1A11:C8 C0 0F 90 EE 98 60 A9 09
1A19:65 85 FD A9 1B 85 FE 60 09
1A21:E6 FD D0 02 E6 FE 60 A9 20
1A29:19 20 6E 0A 20 86 19 F0 9E
1A31:01 60 20 77 19 D0 FA A2 1E
1A39:01 20 C6 FF A0 1E 20 CF 5C
1A41:FF 88 D0 FA 20 FB 17 20 A0
1A49:5B 0A A9 16 A2 04 A0 0C B6
1A51:20 68 0A A9 31 8D 53 03 F4
1A59:A0 04 20 CF FF 99 69 00 19
1A61:88 D0 F7 20 CF FF A6 90 6B
1A69:D0 5B C9 22 D0 F5 20 CF A6
1A71:FF 91 FB C8 C0 10 90 F6 74
1A79:20 CF FF D0 FB 88 B1 FB 20
1A81:C9 5E D0 D4 20 63 0A 20 5C
1A89:89 0A A9 05 85 D3 AD 53 B4
1A91:03 20 D2 FF 20 4F 0A A9 A5
1A99:09 85 D3 A0 00 B1 FB 20 17
1AA1:D2 FF C8 C0 0F 90 F6 98 A5
1AA9:65 FB 85 FB 90 02 E6 FC 57
1AB1:AD 53 03 EE 53 03 C9 39 54
1AB9:90 9E 20 63 0A A9 03 85 9A
1AC1:D3 A9 28 D0 13 20 63 0A 46
1AC9:20 55 0A A9 04 85 D3 A5 C2
1AD1:6A A6 6B 20 2E 0A A9 2D 6E
1AD9:20 6E 0A 20 CC FF 20 FB 9F
1AE1:17 A9 27 A6 D6 E8 A0 05 FB
1AE9:20 68 0A 20 BC 09 C9 0D 36
1AF1:D0 0C A5 90 D0 2B A9 01 D6
1AF9:20 C6 FF 4C 48 1A C9 31 24
1B01:90 E9 CD 53 03 B0 E4 38 C5
1B09:E9 31 0A 0A 0A 0A A8 A2 CE
1B11:00 86 90 B1 FB 9D 4D 1B 22
1B19:20 D2 FF C8 E8 E0 0F 90 1A
1B21:F2 A9 01 20 C3 FF A5 90 57
1B29:60 A8 20 5B 0A 98 A2 0A 75
1B31:A0 08 20 68 0A A0 00 B9 D0
1B39:4D 1B F0 08 20 D2 FF C8 90
1B41:C0 0F 90 F3 60 49 30 24 99
1B49:30 40 30 3A 00 3E 3E 3E 05
1B51:46 49 4C 45 2D 4E 41 4D 4D
1B59:45 3C 3C 5E 2C 53 2C 57 0D
1B61:65 1B 65 1B 00 00 00 00 6F
1B69:00 00 3C 00 00 00 00 00 27
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BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

Smart Disassembler

Article on page 70.

```
FH 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS, INC. -
       ALL RIGHTS RESERVED
AJ 20 NL=39:REM{2 SPACES}NUMBE
      R OF ADDRESS LABELS
PQ 30 ML=820:REM{2 SPACES}STAR
      TING ADDRESS
PG 40 :
EJ 50 POKE53281,0:POKE53280,6
XR 60 PRINT"{CLR}{5}{3 SPACES}
      COPYRIGHT 1989 COMPUTE!
      {SPACE}PUB., INC."
AS 70 PRINTTAB(11)"ALL RIGHTS
      {SPACE}RESERVED{DOWN}"
RB 80 PRINT"{RVS}{2 SPACES}S M
       A R T{3 SPACES}D I S A
      {SPACE}S S E M B L E R
      {3 SPACES}"
AJ 90 PRINTTAB(13)"{2 DOWN}PLE
      ASE WAIT..."
CK 100 DIM OP$(255),TP%(255),L
       C(NL),LB$(NL)
EX 110 DG$="0123456789ABCDEF":
       S$=" "
RS 120 SP$="{28 SPACES}"
MQ 130 CL$=SP$+"{9 SPACES}":FO
       RI=0TO255:READOP$(I)
EJ 140 IF OP$(I)="" THEN OP$(I
       )="BYTE":TP%(I)=14:GOTO
       160
MQ 150 READ TP%(I)
CP 160 NEXT
GA 170 FORI=MLTO ML+38:READA:P
       OKEI,A:NEXT
GR 180 A=INT(ML/256):POKE786,A
       :POKE785,ML-A*256
MA 190 FORI=1TONL:READLB$(I),L
       C(I):NEXT
RE 200 INPUT"{2 DOWN} STARTING
        ADDRESS";SA
KE 210 INPUT"{DOWN} ENDING ADD
       RESS";EA
ED 220 IFEA=0THENEA=65535
XK 230 IFEA<=SA THEN210
XR 240 F=0:PR=0:H=0:RM=0:PRINT
       :GOSUB830:PRINT"{CLR}":
       PC=SA
PJ 250 A$=STR$(PC):IF H THEN G
       OSUB780:A$=S$+RIGHT$(A$
       ,4)
AR 260 P$=A$+"{2 SPACES}":PRIN
       TP$;:J=USR(PC):TC=PC:PR
       INTOP$(J);
RM 270 ONTP%(J)GOSUB440,470,53
       0,550,560,580,600,620,6
       40,660,680,700,490,720
HC 280 PC=PC+N:PRINT A$;TAB(20
       );
MM 290 IF PR THEN PRINT#3,P$;O
       P$(J);A$;
BX 300 A=LEN(P$+OP$(J)+A$):C=2
       3:A$="":FORI=TCTOPC-1
JP 310 PRINT TAB(C)USR(I):PRIN
       T"{UP}";
EC 320 A$=A$+STR$(USR(I)):C=C+
       4:NEXT
KR 330 IF PR THEN PRINT#3,RIGH
       T$(SP$,28-A);A$
BF 340 PRINT:IFPC>EA THEN420
SA 350 A=FRE(0):REM FORCE GARB
       AGE COLLECT.
JP 360 GETA$:IFA$="" THEN250
QA 370 PRINT"{5 SPACES}{DOWN}
       {RVS}SPACE{OFF} - CONTI
       NUE{5 SPACES}{RVS}F1
       {OFF} - MENU{UP}"
GC 380 GETA$:IFA$=""THEN380
SR 390 PRINT CL$;"{2 UP}"
KX 400 IFA$="{F1}"THENGOSUB830
PR 410 GOTO250
CS 420 IF PR THEN PRINT#3:CLOS
       E3
DD 430 PRINT"{DOWN}END OF DISA
       SSEMBLY{DOWN}":END
DK 440 A$=STR$(USR(PC+1))
PX 450 IF H THEN GOSUB820
XC 460 A$=" #"+RIGHT$(A$,LEN(A
       $)-1):N=2:RETURN
FH 470 L=USR(PC+1):M=USR(PC+2)
       :AD=256*M+L:A$=STR$(AD)
       :IFHTHENGOSUB780
ES 480 N=3:RETURN
BQ 490 L=USR(PC+1):M=USR(PC+2)
       :AD=256*M+L
JR 500 IF F THEN GOSUB740:IF K
       THEN520
GD 510 A$=STR$(AD):IF H THEN G
       OSUB780
AA 520 N=3:RETURN
KJ 530 A$=STR$(USR(PC+1)):IFHT
       HENGOSUB820
CD 540 N=2:RETURN
CF 550 A$="":N=1:RETURN
FR 560 A$=STR$(USR(PC+1)):IFHT
       HENGOSUB820
CE 570 A$=" ("+RIGHT$(A$,LEN(A
       $)-1)+",X):N=2:RETURN
SD 580 AD=USR(PC+1):A$=STR$(AD
       ):IFHTHENGOSUB820
DM 590 A$=" ("+RIGHT$(A$,LEN(A
       $)-1)+"),Y":N=2:RETURN
BC 600 AD=USR(PC+1):A$=STR$(AD
       ):IFHTHENGOSUB820
FD 610 A$=A$+",X":N=2:RETURN
HS 620 L=USR(PC+1):M=USR(PC+2)
       :AD=256*M+L:A$=STR$(AD)
       :IFHTHENGOSUB780
QS 630 A$=A$+",X":N=3:RETURN
JA 640 L=USR(PC+1):M=USR(PC+2)
       :AD=256*M+L:A$=STR$(AD)
       :IFHTHENGOSUB780
JJ 650 A$=A$+",Y":N=3:RETURN
RJ 660 N=USR(PC+1):IFN>127THEN
       N=N-256:AD=PC+N+2:A$=ST
       R$(AD):IFHTHENGOSUB780
PM 670 N=2:RETURN
JF 680 L=USR(PC+1):M=USR(PC+2)
       :AD=256*M+L:A$=STR$(AD)
       :IFHTHENGOSUB780
KM 690 A$=" ("+RIGHT$(A$,LEN(A
       $)-1)+")":N=3:RETURN
DQ 700 AD=USR(PC+1):A$=STR$(AD
       ):IFHTHENGOSUB820
EM 710 A$=A$+",Y":N=2:RETURN
CH 720 A$=STR$(J):IFHTHENGOSUB
       820
MX 730 N=1:RETURN
SJ 740 I=1:K=0
RB 750 IF LC(I)=AD THEN A$=S$+
       LB$(I):K=1:RETURN
AG 760 I=I+1:IF I>NL THEN RETU
       RN
EG 770 GOTO750
CR 780 NN=4
HX 790 H$="":A=VAL(A$):FORI=1T
       ONN
PQ 800 T=INT(A/16):H$=MID$(DG$
       ,A-16*T+1,1)+H$:A=T:NEX
       T
SA 810 A$=S$+"$"+H$:RETURN
KH 820 NN=2:GOTO790
KA 830 CLOSE3
```

```
CB 840 PRINT"{DOWN}{7}
       {3 SPACES}F1 - START/RE
       SUME DISASSEMBLY"
MC 850 PRINT"{DOWN}{3 SPACES}F
       3 - SUBROUTINE LABELS:
       {SPACE}{WHT}";:IFFTHEN
       {SPACE}PRINT"ON ":GOTO8
       70
ED 860 PRINT"OFF"
ED 870 PRINT"{DOWN}{7}
       {3 SPACES}F5 - HEX/DECI
       MAL OUTPUT: {WHT}";:IF
       {SPACE}H THENPRINT"HEX
       {4 SPACES}":GOTO890
BJ 880 PRINT"DECIMAL"
BB 890 PRINT"{DOWN}{7}
       {3 SPACES}F6 - DISASSEM
       BLE UNDER ROM: {WHT}";:
       IF RM THENPRINT"YES":GO
       TO910
EQ 900 PRINT"NO "
PC 910 PRINT"{DOWN}{7}
       {3 SPACES}F7 - PRINTER
       {SPACE}OUTPUT: {WHT}";:
       IFPRTHEN PRINT"YES":GOT
       O930
QS 920 PRINT"NO "
HX 930 PRINT"{DOWN}{7}
       {3 SPACES}F8 - QUIT
       {DOWN}{13 UP}"
JX 940 GETA$:IFA$=""THEN940
HX 950 A=ASC(A$):IFA=140THEN C
       LR:PRINT"{CLR}":END
FB 960 IFA<>135THEN990
EB 970 IFHTHENH=0:GOTO840
HP 980 H=1:GOTO840
CD 990 IFA<>136THEN1020
MJ 1000 IFPR THEN PR=0:GOTO840
QS 1010 PR=1:GOTO840
HX 1020 IFA<>134THEN1050
MX 1030 IFFTHENF=0:GOTO840
EH 1040 F=1:GOTO840
MG 1050 IFA<>139THEN1080
CP 1060 IF RM THENRM=0:GOTO840
FC 1070 RM=1:GOTO840
EK 1080 IFA<>133THEN840
ME 1090 IFPRTHENOPEN3,4,0
CH 1100 POKE2,RM
CA 1110 FORA=1TO12:PRINTCL$:NE
       XT
DP 1120 PRINT"{12 UP}";
EG 1130 RETURN
CJ 1140 :
HM 1150 DATA BRK,4,ORA,5,,,,OR
       A,3,ASL,3,
KF 1160 DATA PHP,4,ORA,1,ASL,4
       ,,,ORA,2
MK 1170 DATA ASL,2,,BPL,10,ORA
       ,6,,,
CC 1180 DATA ORA,7,ASL,7,,CLC,
       4,ORA,9,,,
BP 1190 DATA ORA,8,ASL,8,,JSR,
       13,AND,5,,
XP 1200 DATA BIT,3,AND,3,ROL,3
       ,,PLP,4
CB 1210 DATA AND,1,ROL,4,,BIT,
       2,AND,2
RM 1220 DATA ROL,2,,BMI,10,AND
       ,6,,,
SP 1230 DATA AND,7,ROL,7,,SEC,
       4,AND,9,,,
JE 1240 DATA AND,8,ROL,8,,RTI,
       4,EOR,5,,,
ER 1250 DATA EOR,3,LSR,3,,PHA,
       4,EOR,1
HE 1260 DATA LSR,4,,JMP,13,EOR
       ,2,LSR,2,
EM 1270 DATA BVC,10,EOR,6,,,,E
       OR,7,LSR,7,
XS 1280 DATA CLI,4,EOR,9,,,,EO
       R,8
KH 1290 DATA LSR,8,,RTS,4,ADC,
       5,,,
HD 1300 DATA ADC,3,ROR,3,,PLA,
       4,ADC,1
FP 1310 DATA ROR,4,,JMP,11,ADC
       ,2,ROR,2,
QJ 1320 DATA BVS,10,ADC,6,,,,A
       DC,8,ROR,7,
FM 1330 DATA SEI,4,ADC,9,,,,AD
       C,7
DK 1340 DATA ROR,8,,,STA,5,,,S
       TY,3
CB 1350 DATA STA,3,STX,3,,DEY,
       4,,TXA,4,
RA 1360 DATA STY,2,STA,2,STX,2
       ,,BCC,10
FX 1370 DATA STA,6,,STY,7,,STA
       ,7,STX,12,
ME 1380 DATA TYA,4,STA,9,TXS,4
       ,,,STA,8,,
XR 1390 DATA LDY,1,LDA,5,LDX,1
       ,,LDY,3
PG 1400 DATA LDA,3,LDX,3,,TAY,
       4,LDA,1
QP 1410 DATA TAX,4,,LDY,2,LDA,
       2,LDX,2,
PQ 1420 DATA BCS,10,LDA,6,,,LD
       Y,7,LDA,7
AH 1430 DATA LDX,12,,CLV,4,LDA
       ,9,TSX,4,
RH 1440 DATA LDY,8,LDA,8,LDX,9
       ,,CPY,1
MD 1450 DATA CMP,5,,,CPY,3,CMP
       ,3,DEC,3,
CE 1460 DATA INY,4,CMP,1,DEX,4
       ,,CPY,2
FX 1470 DATA CMP,2,DEC,2,,BNE,
       10,CMP,6,,,
EA 1480 DATA CMP,7,DEC,7,,CLD,
       4,CMP,9,,,
FM 1490 DATA CMP,8,DEC,8,,CPX,
       1,SBC,5,,
KG 1500 DATA CPX,3,SBC,3,INC,3
       ,,INX,4
KR 1510 DATA SBC,1,NOP,4,,CPX,
       2,SBC,2
DQ 1520 DATA INC,2,,BEQ,10,SBC
       ,6,,,
BH 1530 DATA SBC,7,INC,7,,SED,
       4,SBC,9,,,
EB 1540 DATA SBC,8,INC,8,
DC 1550 :
GP 1560 DATA 32,247,183,165,10
       1,133,251
EQ 1570 DATA 165,100,133,252,1
       60,0,165,2,240,7,120,1
       65
XQ 1580 DATA 1,41,252,133,1,17
       7,251,168
QB 1590 DATA 165,1,9,3,133,1,8
       8,169,0
HE 1600 DATA 76,145,179
FF 1610 :
HH 1620 REM{2 SPACES}LABEL DAT
       A
XH 1630 :
GS 1640 DATA CHROUT,65490,GETI
       N,65508
DX 1650 DATA SETLFS,65466,SETM
       SG,65424
EG 1660 DATA SETNAM,65469,SAVE
       ,65496
EF 1670 DATA LOAD,65493,OPEN,6
       5472
GJ 1680 DATA CHRIN,65487,CLOSE
       ,65475
GE 1690 DATA CLALL,65511,CHKIN
       ,65478
QK 1700 DATA READST,65463,CHKO
       UT,65481
ES 1710 DATA CLRCHN,65484,PLOT
       ,65520
JK 1720 DATA LISTEN,65457,CIOU
       T,65448
AQ 1730 DATA CINT,65409,SECOND
       ,65427
EX 1740 DATA SCNKEY,65439,REST
       OR,65418
SD 1750 DATA TALK,65460,IOBASE
       ,65523
FJ 1760 DATA ACPTR,65445,IOINI
       T,65412
HR 1770 DATA MEMBOT,65436,MEMT
       OP,65433
RS 1780 DATA UNLSN,65454,VECTO
       R,65421
RM 1790 DATA UNTLK,65451,SETTI
       M,65499
FK 1800 DATA SETTMO,65442,RAMT
       AS,65415
PC 1810 DATA RDTIM,65502,UDTIM
       ,65514
BC 1820 DATA TKSA,65430,STOP,6
       5505
KP 1830 DATA SCREEN,65517
FE 1840 :
PG 1850 REM{2 SPACES}ADD YOUR
       {SPACE}OWN ADDRESS LAB
       ELS
KF 1860 REM{2 SPACES}IN DATA S
       TATEMENTS AFTER
SP 1870 REM{2 SPACES}THESE LIN
       ES
```

128 Animator

Article on page 68.

Program 1: 128 Animator

```
FH 10 REM COPYRIGHT 1989 COMPU
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AK 20 POKE48,64:CLR:U=54534:V=
      56576:B=0:D=0:R=50:GOSUB
      210:GOTO650
RC 30 POKEU,4:POKEV,198:RETURN
FC 40 POKEU,4:POKEV,197:RETURN
XF 50 POKEU,68:POKEV,197:RETUR
      N
AD 60 POKEU,68:POKEV,198:RETUR
      N
BS 70 POKEU,68:POKEV,199:FORX=
      1TOD:NEXTX:RETURN
QG 80 POKEU,4:POKEV,199:FORX=1
      TOD:NEXTX:RETURN
FP 90 POKE53280,B:GRAPHIC1,0:F
      ORX=1TOD:NEXTX:POKE216,2
      55
SG 100 FORS=1TOK:ONSGOSUB 80,3
       0,40,50,60,70
JE 110 FORX=1TOD:NEXTX,S:FORS=
       K-2TO1STEP-1
SH 120 ONSGOSUB 30,40,50,60
HG 130 FORX=1TOD:NEXTX,S:GETK$
       :POKE208,0:IFK$=""THEN1
       00
FF 140 IFK$="+"THEND=D-5:IFD<0
       THEND=0
QS 150 IFK$="-"THEND=D+5:IFD>2
       00THEND=200
GR 160 IFK$="+"THEND=D-25:IFD<
       0THEND=0
XQ 170 IFK$="-"THEND=D+25:IFD>
       200THEND=200
JR 180 IFK$<>CHR$(13)THEN100
XJ 190 POKE216,32:POKEU,4:POKE
       V,199:POKE53280,0:POKE5
       3281,0:GRAPHIC0,1:GOTO6
       50
EQ 200 POKE216,32:POKEU,4:POKE
       V,199:POKE53280,13:POKE
       53281,11:PRINT"{CLR}{6}
       ":GRAPHIC0,1:END
FM 210 GRAPHIC1,1:GRAPHIC0,1:P
       RINT"{CLR}{CYN}":POKE53
       280,0:POKE53281,0
```

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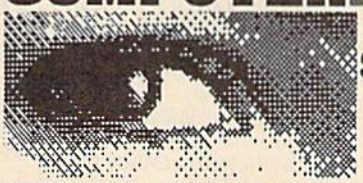

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```
PQ 220 A$="128 ANIMATOR":B$="C
       OPYRIGHT 1989 COMPUTE!
       {SPACE}PUB., INC."
EM 230 C$="ALL RIGHTS RESERVED
       "
KB 240 PRINT"{8 DOWN}"TAB(20-(
       LEN(A$)/2))"{RVS}"A$
PX 250 PRINT"{4 DOWN}"TAB(20-(
       LEN(B$)/2))B$
GB 260 PRINTTAB(20-(LEN(C$)/2)
       )C$
SC 270 PRINT"{3}{4 DOWN}"TAB(7
       )"PRESS ANY KEY TO CONT
       INUE":GETKEYK$
PA 280 PRINT"{CLR}{YEL}
       {2 DOWN}"TAB(2)"YOU HAV
       E THE OPTION OF LOADING
        UP TO"
MJ 290 PRINTTAB(6)"{DOWN}SIX B
       ITMAP SCREENS AT A TIME
       ":K=1
QG 300 PRINTTAB(6)"{7}{DOWN}EN
       TER SCREEN FILENAME AS
       {SPACE}IT"
MK 310 PRINTTAB(6)"APPEARS ON
       {SPACE}THE DISK DIRECTO
       RY":PRINTTAB(6)"ENTER A
       T LEAST TWO FILENAMES":
       PRINT"{DOWN}"TAB(6);:L$
       =""
AJ 320 PRINT"{@}{LEFT}";:GETKE
       YK$:IFK$=CHR$(13)THENPR
       INT" ":F$(K)=L$:GOTO370
KD 330 IF(K$=CHR$(20))AND(LEN(
       L$)>0)THENL$=LEFT$(L$,L
       EN(L$)-1):PRINTK$;:GOTO
       320
CK 340 IFK$=CHR$(20)THEN320
DC 350 IFLEN(L$)>=16THEN320
BJ 360 L$=L$+K$:PRINTK$;:GOTO3
       20
KE 370 IFF$(K)=""THEN400
MC 380 IFK>=6THENGOTO410
DH 390 K=K+1:GOTO300
PJ 400 K=K-1:IFK<2THENK=K+1:GO
       TO300
PP 410 PRINT"{CLR}{6 DOWN}
       {YEL}"TAB(6)"YOU HAVE L
       ISTED"K"SCREENS"
PX 420 PRINTTAB(6)"THEY ARE:":
       PRINT"{DOWN}"
GH 430 FORC=1TOK:PRINT"{7}"TAB
       (6)C"{LEFT}.{RIGHT}"F$(
       C):NEXT
QG 440 PRINTTAB(2)"{2 DOWN}{3}
       PRESS 'Y' TO ACCEPT OR
       {SPACE}'N' TO REJECT"
GA 450 GETKEYK$:IFK$="N"THENPR
       INT"{CLR}":GOTO280
EM 460 IFK$="Y"THEN480
CC 470 GOTO450
DE 480 FORC=1TOK:ON C GOSUB490
       ,500,510,520,530,540:NE
       XTC:RETURN
MM 490 PRINT"{CLR}{YEL}
       {8 DOWN}"TAB(6)"LOADING
        "F$(C):BLOAD(F$(C)),B0
       ,P7168:RETURN
DF 500 PRINTTAB(6)"{DOWN}LOADI
       NG "F$(C):BLOAD(F$(C)),
       B0,P23552:RETURN
HD 510 PRINTTAB(6)"{DOWN}LOADI
       NG "F$(C):BLOAD(F$(C)),
       B0,P39936:RETURN
RA 520 PRINTTAB(6)"{DOWN}LOADI
       NG "F$(C):BLOAD(F$(C)),
       B1,P39936:RETURN
EJ 530 PRINTTAB(6)"{DOWN}LOADI
       NG "F$(C):BLOAD(F$(C)),
       B1,P23552:RETURN
PJ 540 PRINTTAB(6)"{DOWN}LOADI
       NG "F$(C):BLOAD(F$(C)),
       B1,P7168:RETURN
AJ 550 END
RC 560 K=-K:C=0:PRINT"{CLR}
       {10 DOWN}"TAB(4)"PRESS
       {SPACE}KEY NUMBER OF SC
       REEN (1"K"{LEFT})":K=-K
JR 570 PRINTTAB(11)"{DOWN}TO D
       ISPLAY SCREEN"
AB 580 PRINTTAB(10)"{DOWN}PRES
       S RETURN TO END"
QQ 590 GETKEYK$:IFK$<>CHR$(13)
       THEN610
AM 600 GOTO190
MD 610 C=VAL(K$):IFC<1ORC>KTHE
       N590
RF 620 GRAPHIC1,0:POKE216,255
ES 630 ONCGOSUB750,760,770,780
       ,790,800
AX 640 GOTO590
CC 650 PRINT"{CLR}{10 DOWN}"TA
       B(12)"DO YOU WANT TO:"
SX 660 PRINTTAB(7)"{DOWN}{RVS}
       A{OFF} VIEW SCREENS AUT
       OMATICALLY"
QD 670 PRINTTAB(7)"{DOWN}{RVS}
       M{OFF} VIEW SCREENS MAN
       UALLY"
QF 680 PRINTTAB(7)"{DOWN}{RVS}
       S{OFF} SELECT NEW SCREE
       NS"
JF 690 PRINTTAB(7)"{DOWN}{RVS}
       E{OFF} END PROGRAM
PX 700 GETKEYK$:IFK$="E"THEN20
       0
XR 710 IFK$="A"THEN90
JC 720 IFK$="M"THEN560
FQ 730 IFK$="S"THENGOSUB280:GO
       TO650
DD 740 GOTO700
AD 750 POKEU,4:POKEV,199:RETUR
       N
JD 760 POKEU,4:POKEV,198:RETUR
       N
AC 770 POKEU,4:POKEV,197:RETUR
       N
KA 780 POKEU,68:POKEV,197:RETU
       RN
JS 790 POKEU,68:POKEV,198:RETU
       RN
GR 800 POKEU,68:POKEV,199:RETU
       RN
FP 810 GOTO 590
```

Program 2: Screen Generator

```
FH 10 REM COPYRIGHT 1989 COMPU
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FJ 20 COLOR0,1:COLOR4,1:PRINT"
      {CLR}{YEL}{2 SPACES}COPY
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      , INC.":PRINTTAB(11)"ALL
       RIGHTS RESERVED":FORX=1
      TO750:NEXTX
RS 30 X=159:Y=99:L=86:H=50:S=0
      :E=360:N=0:I=90:C=1
RG 40 COLOR0,1:COLOR4,1:COLOR1
      ,12:GRAPHIC1,1:WIDTH2:CO
      LOR1,15
AJ 50 FORZ=6TO1STEP-1:CIRCLE1,
      X,Y,L,H,S,E,N,I:L=L+14:H
      =H+10:NEXTZ
CF 60 C$=RIGHT$(STR$(C),1):BSA
      VE"PIC"+C$,P7168 TO P163
      84
MR 70 L=L-84:H=H-70:C=C+1:IFC<
      =6THEN40
QM 80 GRAPHIC0,1:PRINT"{CLR}
      {YEL}{12 DOWN}"TAB(9)"PR
      ESS ANY KEY TO LOAD"
GA 90 PRINTTAB(13)"{DOWN}128 A
      NIMATOR"
MC 100 GETKEYA$:RUN "128ANIM"
```

Machine Language Programming: BASIC String Thing

Article on page 87.

```
100 REM FOR 64 ONLY
110 REM STRING MUST BE DEFINED
      FIRST
120 REM EXAMPLE BELOW ALLOWS 5
      CHARACTERS
130 A$="{5 SPACES}"+""
140 DATA 160,2,177,45,153,137,
      0,200
150 DATA 192,6,208,246,32,228,
      255
160 DATA 240,251,201,13,240,16
      ,164,142
170 DATA 196,139,176,241,32,21
      0,255
180 DATA 145,140,200,132,142,2
      08,231
190 DATA 76,210,255
200 FOR J=896 TO 935
210 READ X
220 T=T+X
230 POKE J,X
240 NEXT J
250 IF T<>6296 THEN STOP
260 PRINT "TYPE THE STRING: ";
270 SYS 896
280 L=PEEK(142)
290 PRINT "I RECEIVED: ";LEFT$
      (A$,L)
300 PRINT "TYPE THE STRING: ";
310 SYS 896
320 L=PEEK(142)
330 PRINT "I RECEIVED: ";LEFT$
      (A$,L)
```

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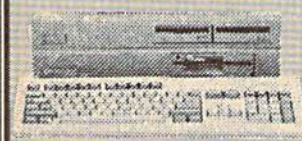

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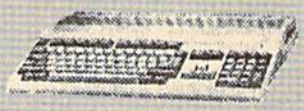

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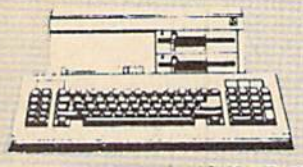

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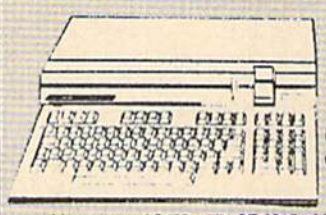

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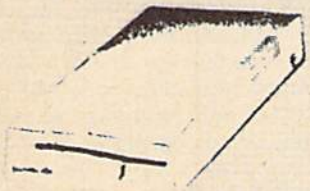

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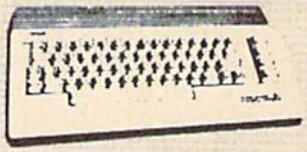

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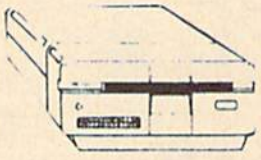

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MLX Machine Language Entry Program For Commodore 64

Ottis Cowper

"MLX" is a labor-saving utility that allows almost fail-safe entry of Commodore 64 machine language programs.

Type in and save some copies of MLX—you'll want to use it to enter future ML programs from COMPUTE!'s GAZETTE. When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters A–F. But don't worry—even if you know nothing about ML or hex, you should have no trouble using MLX.

After you enter the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option.

A functions menu will appear. The first option in the menu is ENTER DATA. If you're just starting to type in a program, pick this. Press the E key, and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you left off typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing RETURN alone when asked for the address. (You can get back to the menu from most options by pressing RETURN with no other input.)

Entering A Listing

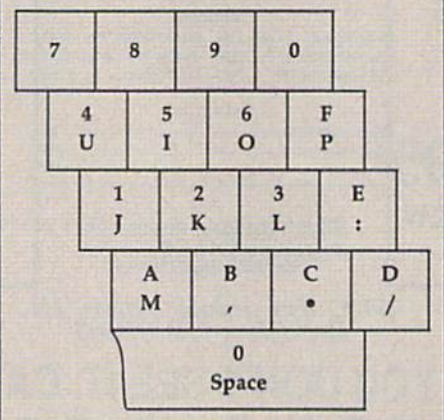
Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an MLX-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing.

When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; MLX automatically inserts these for you. You *do not* press RETURN after typing the last number in a line; MLX automatically enters and checks the line after you type the last digit.

Only the numerals 0–9 and the letters A–F can be typed in. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, the numeric keypad modification from the March 1986 "Bug-Swatter" column is now incorporated in the listing. The keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figure below shows the keypad configuration:



MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake. There is one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take reasonable care while entering data.

Editing Features

To correct typing mistakes before finishing a line, use the INST/DEL key to delete the character to the left of the cursor. (The cursor-left key also deletes.) If you mess up a line really badly, press CLR/HOME to start the line over. The RETURN key is also active, but only before any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you type a character of data, MLX disables RETURN until the cursor returns to the start of a line. Remember, you can press CLR/HOME to quickly get to a line number prompt.

More editing features are available when correcting lines in which MLX has detected an error. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing, then move the cursor to the mistake and type the correct key. The cursor left and right keys provide the normal cursor controls. (The INST/DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, RETURN is active; pressing it tells MLX to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch, or if you want to get to a line number prompt to use RETURN to get back to the menu.

Display Data

The second menu choice, DISPLAY DATA, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at which point the menu is redis-

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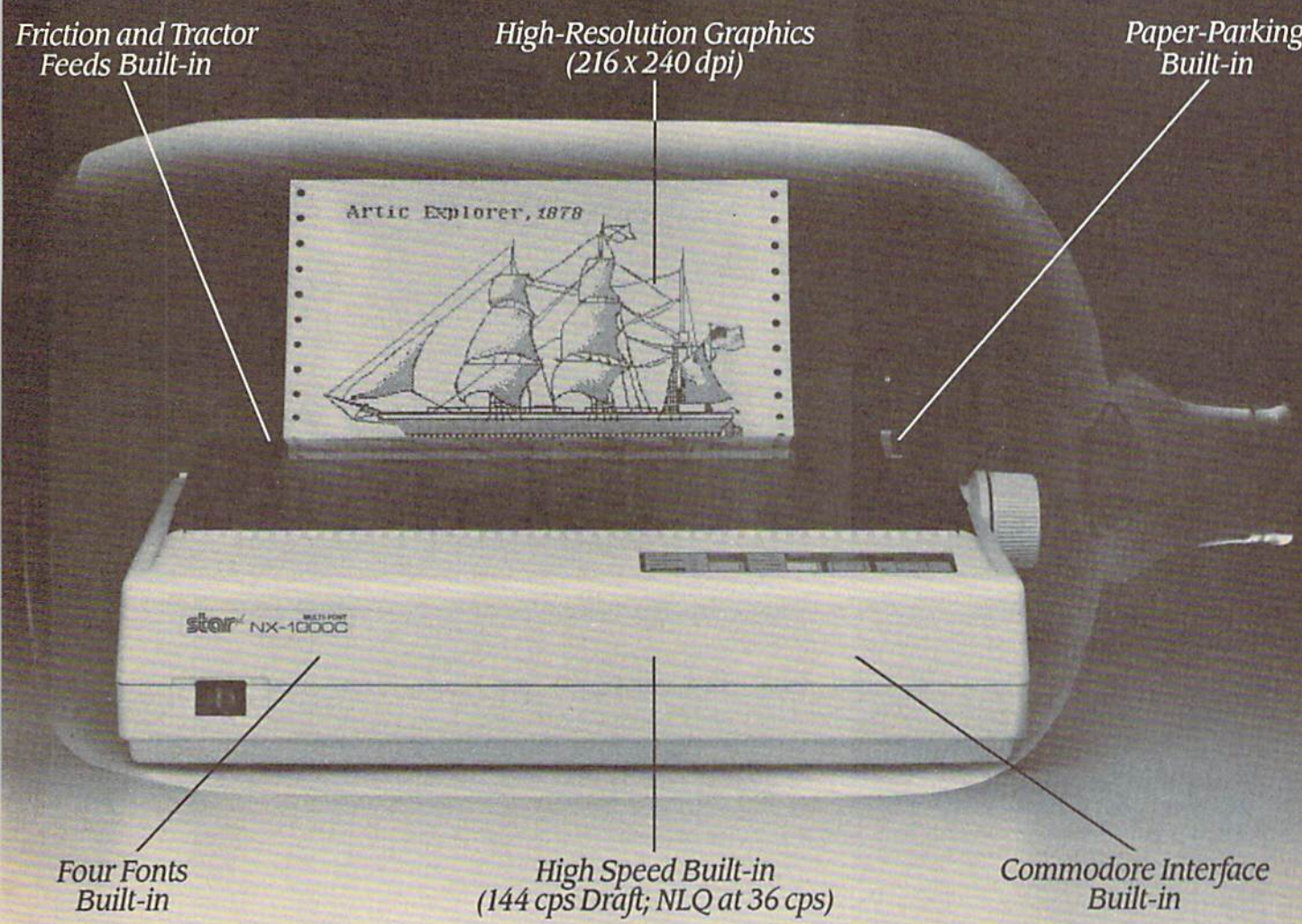

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played. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press space again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press RETURN.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are SAVE FILE and LOAD FILE; their operation is quite straightforward. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save. Don't panic; this is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. Disk users should also note that the drive prefix 0: is automatically added to the filename (line 750), so this should *not* be included when entering the name. This also precludes the use of @ for Save-with-Replace, so remember to give each version you save a different name.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When saving a partially completed listing, make sure to note the address where you stopped typing so you'll know where to resume entry when you reload.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. (Tape users should bear in mind that Commodore computers are never able to detect errors during a save to tape.) MLX also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT *address*, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct starting and ending addresses.

The QUIT menu option has the obvious effect—it stops MLX and enters BASIC. The RUN/STOP key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, RUN/STOP–RESTORE also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the clear workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD *"filename"*,8 for disk or LOAD *"filename"* for tape, and then RUN. Such programs will usually have a starting address of 0801 for the 64. Other programs must be reloaded to specific addresses with a command such as LOAD *"filename"*,8,1 for disk or LOAD *"filename"*,1,1 for tape, and then started with a SYS to a particular memory address. On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000. In either case, you should always refer to the article which accompanies the ML listing for information on loading and running the program.

An Ounce Of Prevention

By the time you finish typing in the data for a long ML program, you may have several hours invested in the project. Don't take chances—use our "Automatic Proofreader" to type the new MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses, and then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to insure that you can recall your work from disk or tape. Don't let a simple typing error in the new MLX cost you several nights of hard work.

MLX For Commodore 64

```
SS 10 REM VERSION 1.1: LINES 8
      30,950 MODIFIED, LINES 4
      85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
      I,J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
      4=254:Z5=255:Z6=256:Z7=
      127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
      :BS=PEEK(55)+Z6*PEEK(56
      ):H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
      :S$=" ":D$=CHR$(20):Z$=
      CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
      +23:POKE I,0:NEXT:POKE
      {SPACE}SD+24,15:POKE 78
      8,52
FC 150 PRINT"{CLR}"CHR$(142)CH
      R$(8):POKE 53280,15:POK
      E 53281,15
EJ 160 PRINT T$" {RED}{RVS}
      {2 SPACES}[8 @]
      {2 SPACES}"SPC(28)"
      {2 SPACES}{OFF}{BLU} ML
      X II {RED}{RVS}
      {2 SPACES}"SPC(28)"
      {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}
      {3 SPACES}COMPUTE!'S MA
      CHINE LANGUAGE EDITOR
      {3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADD
      RESS[4]";:GOSUB300:SA=A
      D:GOSUB1040:IF F THEN18
      0
GF 190 PRINT"{BLK}{2 SPACES}EN
      DING ADDRESS[4]";:GOSUB
      300:EA=AD:GOSUB1030:IF
      {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEA
      R WORKSPACE [Y/N][4]";A
      $:IF LEFT$(A$,1)<>"Y"TH
      EN220
PG 210 PRINT"{2 DOWN}{BLU}WORK
      ING...";:FORI=BS TO BS+
      EA-SA+7:POKE I,0:NEXT:P
      RINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}
      {BLK}{RVS} MLX COMMAND
      {SPACE}MENU {DOWN}[4]":
      PRINT T$"{RVS}E{OFF}NTE
      R DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISP
      LAY DATA":PRINT T$"
      {RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE
       FILE":PRINT T$"{RVS}Q
      {OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
      MID$("EDLSQ",I,1)THEN A
      =I:I=5
FD 270 NEXT:ON A GOTO420,610,6
      90,700,280:GOSUB1060:GO
      TO250
EJ 280 PRINT"{RVS} QUIT ":INPU
      T"{DOWN}[4]ARE YOU SURE
       [Y/N]";A$:IF LEFT$(A$,
      1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
      LEN(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$
      =MID$(IN$,3):GOSUB320:A
      D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
      $(B$,J,1):B=ASC(A$)-C4+
      (A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
      0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
      H$,B+1,1);:B=A-B*C6:PRI
      NT MID$(H$,B+1,1);:RETU
      RN
RR 360 A=INT(AD/Z6):GOSUB350:A
      =AD-A*Z6:GOSUB350:PRINT
      ":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
      CK+Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
```

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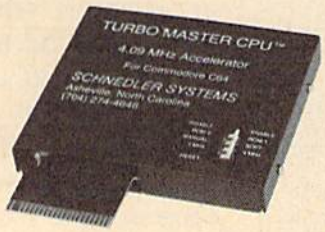

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```
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
       [4]";:GOSUB300:IF IN$<>
       N$ THEN GOSUB1030:IF F
       {SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA
       {SPACE}":GOSUB400:IF IN
       $=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F
        THEN PRINT IN$:PRINT"
       {UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$
       =S$:FOR J=1 TO 2:IF F T
       HEN B$=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$L$;:IF I<
       24THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF(A$>"/"ANDA$<":")OR(A
       $>"@"ANDA$<"G")THEN540
GS 485 A=-(A$="M")-2*(A$=",")-
       3*(A$=".")-4*(A$="/")-5
       *(A$="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=:
       ")-9*(A$="U")-10*(A$="I
       ")-11*(A$="O")-12*(A$="
       P")
CM 487 A=A-13*(A$=S$):IF A THE
       N A$=MID$("ABCD123E456F
       0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J
       =1)OR F)THEN PRINT B$;:
       J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRI
       NT B$:J=2:NEXT:I=24:NEX
       T:F=0:GOTO440
MX 510 IF(A$="{RIGHT}")ANDF TH
       ENPRINT B$L$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR
       ((I=0)AND(J=1))THEN GOS
       UB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;
       :J=2-J:IF J THEN PRINT
       {SPACE}L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT
       {SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"{UP}
       {5 RIGHT}";:INPUT#3,IN$
       :IF IN$=N$ THEN CLOSE3:
       GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=
       MID$(IN$,I):GOSUB320:IF
        I<25 THEN GOSUB380:A(I
       /3)=A
PK 570 NEXT:IF A<>CK THEN GOSU
       B1060:PRINT"{BLK}{RVS}
       {SPACE}ERROR: REENTER L
       INE [4]":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
       R I=0 TO 7:POKE B+I,A(I
       ):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
       LOSE3:PRINT"{DOWN}{BLU}
       ** END OF ENTRY **{BLK}
       {2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS}
       {SPACE}DISPLAY DATA ":G
       OSUB400:IF IN$=N$ THEN2
       20
RJ 620 PRINT"{DOWN}{BLU}PRESS:
        {RVS}SPACE{OFF} TO PAU
       SE, {RVS}RETURN{OFF} TO
        BREAK[4]{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR
       I=BTO B+7:A=PEEK(I):GOS
       UB350:GOSUB380:PRINT S$
       ;
CC 640 NEXT:PRINT"{RVS}";:A=CK
       :GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA TH
       ENPRINT"{DOWN}{BLU}** E
       ND OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GO
       SUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOS
       UB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD
       {SPACE}DATA ":OP=1:GOTO
       710
PC 700 PRINT"{DOWN}{RVS} SAVE
       {SPACE}FILE ":OP=0
RX 710 IN$=N$:INPUT"{DOWN}FILE
       NAME[4]";IN$:IF IN$=N$
       {SPACE}THEN220
PR 720 F=0:PRINT"{DOWN}{BLK}
       {RVS}T{OFF}APE OR {RVS}
       D{OFF}ISK: [4]";
FP 730 GET A$:IF A$="T"THEN PR
       INT"T{DOWN}":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8
       ,15,"I0:":B=EA-SA:IN$="
       0:"+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":G
       OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
       H*256):PRINT#1,CHR$(AL)
       ;CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
       R$(PEEK(BS+I));:IF ST T
       HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
       O940
GS 800 GOSUB1060:PRINT"{DOWN}
       {BLK}ERROR DURING SAVE:
       [4]":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":G
       OSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z
       $)+256*ASC(B$+Z$):IF AD
       <>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:P
       OKE BS+I,ASC(A$+Z$):IF(
       I<>B)AND ST THEN F=2:AD
       =I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
       >0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN
        CLOSE1:CLOSE15:GOSUB10
       60:PRINT"{RVS}ERROR: "A
       $
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE
       187,PEEK(FA+3):POKE188,
       PEEK(FA+4):IFOP=0THEN92
       0
HJ 890 SYS 63466:IF(PEEK(783)A
       ND1)THEN GOSUB1060:PRIN
       T"{DOWN}{RVS} FILE NOT
       {SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
       30):IF AD<>SA THEN F=1:
       GOTO970
SC 910 A=PEEK(831)+256*PEEK(83
       2)-1:F=F-2*(A<EA)-3*(A>
       EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:P
       OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
       UB1010:ON OP GOTO950:SY
       S 63591
AE 940 GOSUB1080:PRINT"{BLU}**
        SAVE COMPLETED **":GOT
       O220
XP 950 POKE147,0:SYS 63562:IF
       {SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}**
        LOAD COMPLETED **":GOT
       O220
DP 970 GOSUB1060:PRINT"{BLK}
       {RVS}ERROR DURING LOAD:
       {DOWN}[4]":ON F GOSUB98
       0,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
       G ADDRESS (";:GOSUB360:
       PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:
       AD=SA+AD:GOSUB360:PRINT
       D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
       ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
       *256):POKE193,AL:POKE1
       94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
       *256):POKE174,AL:POKE1
       75,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN
       1050
HA 1040 IF(AD>511 AND AD<40960
       )OR(AD>49151 AND AD<53
       248)THEN GOSUB1080:F=0
       :RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
       {SPACE}INVALID ADDRESS
        {DOWN}{BLK}":F=1:RETU
       RN
AR 1060 POKE SD+5,31:POKE SD+6
       ,208:POKE SD,240:POKE
       {SPACE}SD+1,4:POKE SD+
       4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
       TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
       240:POKE SD,0:POKE SD+
       1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
       KE SD+4,0:POKE SD,0:PO
       KE SD+1,0:RETURN
```

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"The Automatic Proofreader" helps you type in program listings for the 128, 64, Plus/4, and 16 and prevents nearly every kind of typing mistake.

Type in the Proofreader *exactly* as listed. Since the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unfamiliar commands. After finishing, save a copy or two on disk or tape before running it. This is important because the Proofreader erases the BASIC portion of itself when you run it, leaving only the machine language portion in memory.

Next, type RUN and press RETURN. After announcing which computer it's running on, the Proofreader displays the message "Proofreader Active". Now you're ready to type in a BASIC program.

Every time you finish typing a line and press RETURN, the Proofreader displays a two-letter checksum in the upper-left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, it's almost certain the line was typed correctly. If the letters don't match, check for your mistake and correct the line.

The Proofreader ignores spaces not enclosed in quotes, so you can omit or add spaces between keywords and still see a matching checksum. However, since spaces inside quotes are almost always significant, the Proofreader pays attention to them. For example, **10 PRINT"THIS IS BASIC"** will generate a different checksum than **10 PRINT"THIS ISBA SIC"**.

A common typing error is transposition—typing two successive characters in the wrong order, like PIRNT instead of PRINT or 64378 instead of 64738. The Proofreader is sensitive to the *position* of each character within the line and thus catches transposition errors.

The Proofreader does *not* accept keyword abbreviations (for example, ? instead of PRINT). If you prefer to use abbreviations, you can still check the line by LISTing it after typing it in, moving the cursor back to the line, and pressing RETURN. LISTing the line substitutes the full keyword for the abbreviation and allows the Proofreader to work properly. The same technique works for rechecking programs you've already typed in.

If you're using the Proofreader on the Commodore 128, Plus/4, or 16, *do not perform any GRAPHIC commands while the Proofreader is active.* When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing the Proofreader to crash. The same thing happens if you *run* any program with a GRAPHIC command while the Proofreader is in memory.

Though the Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. However, the Proofreader is purposely difficult to dislodge: It's not affected by tape or disk operations, or by pressing RUN/STOP- RESTORE. The simplest way to disable it is to turn the computer off then on. A gentler method is to SYS to the computer's built-in reset routine (SYS 65341 for the 128, 64738 for the 64, and 65526 for the Plus/4 and 16). These reset routines erase any program in memory, so be sure to save the program you're typing in before entering the SYS command.

If you own a Commodore 64, you may already have wondered whether the Proofreader works with other programming utilities like "MetaBASIC." The answer is generally yes, *if you're using a 64 and activate the Proofreader after installing the other utility.* For example, first load and activate MetaBASIC, then load and run the Proofreader.

When using the Proofreader with another utility, you should disable *both* programs before running a BASIC program. While the Proofreader seems unaffected by most utilities, there's no way to promise that it will work with any and every combination of utilities you might want to use. The more utilities activated, the more fragile the system becomes.

The New Automatic Proofreader

```
10 VEC=PEEK(772)+256*PEEK(773)
   :LO=43:HI=44
20 PRINT "AUTOMATIC PROOFREADE
   R FOR ";:IF VEC=42364 THEN
   {SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VI
   C-20"
40 IF VEC=35158 THEN GRAPHIC C
   LR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=
   46:GRAPHIC CLR:PRINT"128"
60 SA=(PEEK(LO)+256*PEEK(HI))+
   6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POK
   E ADR,BYT:ADR=ADR+1:CHK=CHK
   +BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*
   ERROR* CHECK TYPING IN DATA
    STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L
   F,LB:POKE SA+HF,HB:NEXT
110 IF CHK<>22054 THEN PRINT "
   *ERROR* RELOAD PROGRAM AND
   {SPACE}CHECK FINAL LINE":EN
   D
120 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+
   14,22:POKE SA+18,23:POKESA+
   29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"
   PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (P
   EEK(LO)+256*PEEK(HI))-1,0:N
   EW
160 DATA 120,169,73,141,4,3,16
   9,3,141,5,3
170 DATA 88,96,165,20,133,167,
   165,21,133,168,169
180 DATA 0,141,0,255,162,31,18
   1,199,157,227,3
190 DATA 202,16,248,169,19,32,
   210,255,169,18,32
200 DATA 210,255,160,0,132,180
   ,132,176,136,230,180
210 DATA 200,185,0,2,240,46,20
   1,34,208,8,72
220 DATA 165,176,73,255,133,17
   6,104,72,201,32,208
230 DATA 7,165,176,208,3,104,2
   08,226,104,166,180
240 DATA 24,165,167,121,0,2,13
   3,167,165,168,105
250 DATA 0,133,168,202,208,239
   ,240,202,165,167,69
260 DATA 168,72,41,15,168,185,
   211,3,32,210,255
270 DATA 104,74,74,74,74,168,1
   85,211,3,32,210
280 DATA 255,162,31,189,227,3,
   149,199,202,16,248
290 DATA 169,146,32,210,255,76
   ,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,
   77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,136
   ,137
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How To Type In *COMPUTE!'s Gazette* Programs

Each month, COMPUTE!'s Gazette publishes programs for the Commodore 128, 64, Plus/4, and 16. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We frequently publish two programs designed to make typing easier: The Automatic Proofreader, and MLX, designed for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off then on, erasing what was in memory. So be sure to *save a program before you run it.* If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from the GAZETTE, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor down key; {5 SPACES} means to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing another key), the character is underlined. For example, A means hold down the SHIFT key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight SHIFTed A's).

If a key is enclosed in special brackets, [ ], hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the CTRL key while typing the letter in braces. For example, {A} means to press CTRL-A.

The Quote Mode

Although you can move the cursor around the screen with the CRSR keys, often a programmer will want to move the cursor under program control. This is seen in examples such as {LEFT}, and {HOME} in the program listings. The only way the computer can tell the difference between direct and programmed cursor control is *the quote mode.*

Once you press the quote key, you're in quote mode. This mode can be confusing if you mistype a character and cursor left to change it. You'll see a reverse video character (a graphics symbol for cursor left). In this case, you can use the DELete key to back up and edit the line. Type another quote and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing RETURN. Then just cursor up to the mistyped line and fix it.

When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT + ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT + ← CRSR →	
{RIGHT}	← CRSR →	
{RVS}	CTRL + 9	
{OFF}	CTRL + 0	
{BLK}	CTRL + 1	
{WHT}	CTRL + 2	
{RED}	CTRL + 3	
{CYN}	CTRL + 4	

When You Read:	Press:	See:
{PUR}	CTRL + 5	
{GRN}	CTRL + 6	
{BLU}	CTRL + 7	
{YEL}	CTRL + 8	
{ F1 }	f1	
{ F2 }	SHIFT + f1	
{ F3 }	f3	
{ F4 }	SHIFT + f3	
{ F5 }	f5	
{ F6 }	SHIFT + f5	
{ F7 }	f7	
{ F8 }	SHIFT + f7	

When You Read:	Press:	See:
←	←	
↑	SHIFT + ↑	

For Commodore 64 Only

[1]	COMMODORE + 1	
[2]	COMMODORE + 2	
[3]	COMMODORE + 3	
[4]	COMMODORE + 4	
[5]	COMMODORE + 5	
[6]	COMMODORE + 6	
[7]	COMMODORE + 7	
[8]	COMMODORE + 8	

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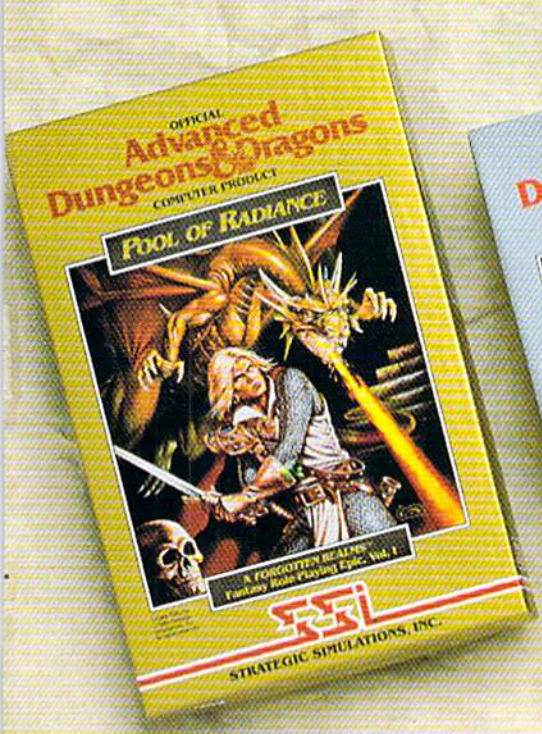

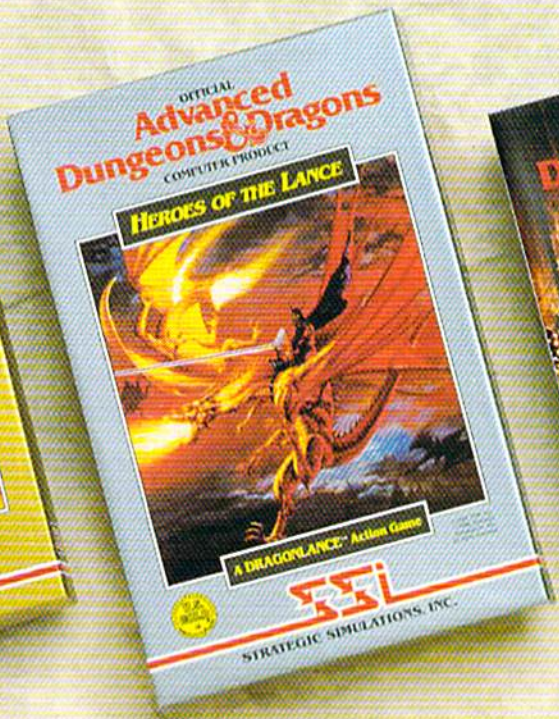

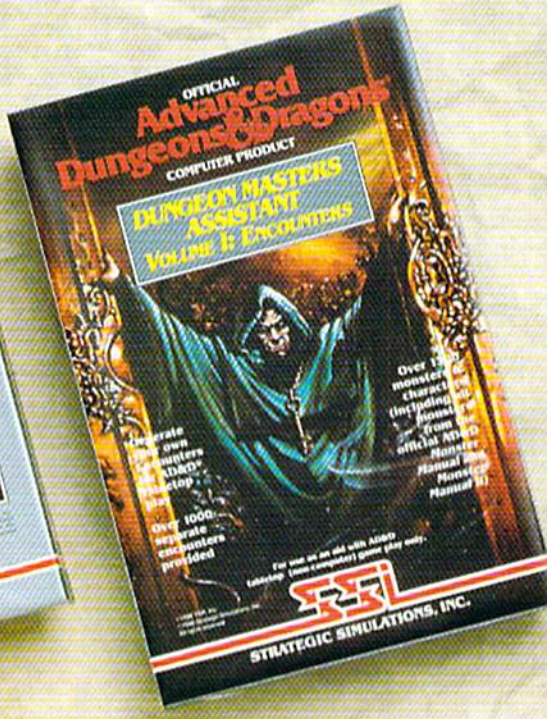

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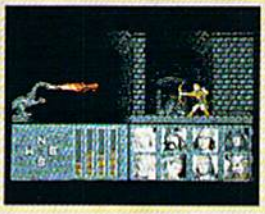

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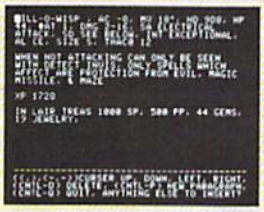

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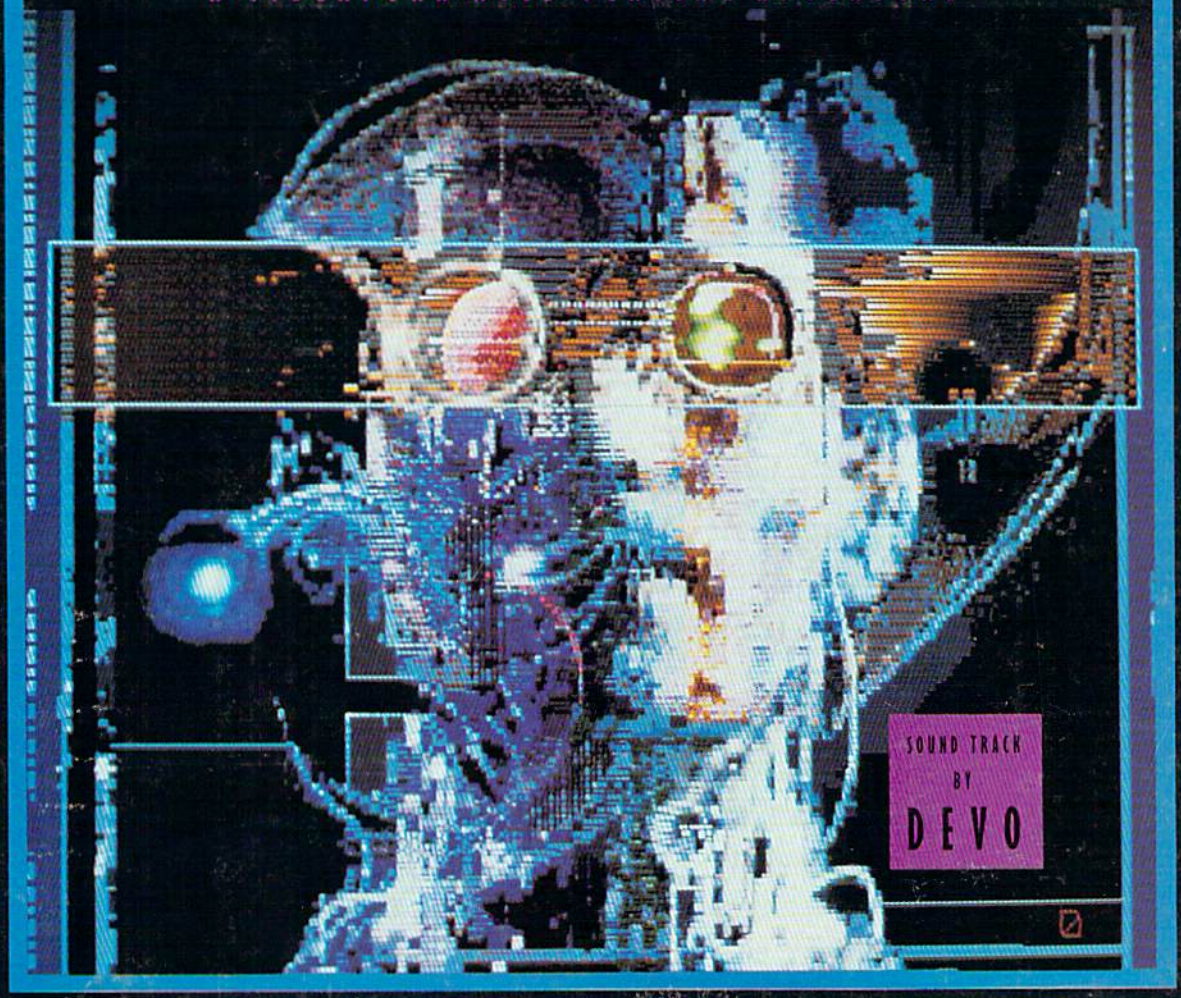

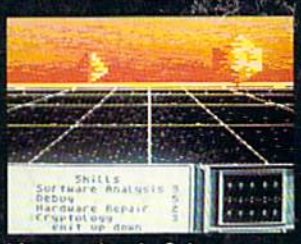

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